Honours	... ...	T. D. Ponniah P. Sankunni Menon
Gold Medal for the highest Senior Student		T. D. Ponniah
Board of Visitors Gold Medal for the highest Junior student	...	G. Appa Rao
Lodge Gold Medal for Engineering	...	T. D. Ponniah
Forestry Prize	...	T. D. Ponniah
Survey Prize	...	P. Sankunni Menon
Range Administration Prize	...	T. D. Ponniah
Botany Prize	...	C. R. Regunathan
Indian Forester Gold Medal for Past Student	...	L. J. Taylor
Indian Forester Gold Medal for present student	...	E. S. Wambeck
Pentland Challenge Shield	...	C. B. Chengappa
Fischer Prize for Gymnastics	...	D. Venkateswaralu

Madras Ranger Higher Certificates.

C. N. Narasimmachari
T. Pedda Lakshmiah Naidu
B. S. Chengappa
E. S. Wambeck
C. L. Narayana Rao
C. R. Regunathan
A. M. Srinivasalu Naidu
P. Ramaswami Ayengar
Umapathi Moodaliar
C. Mahadevan
M. Gulab Singh
A. Joseph
Abdul Hahmed Khan
T. D. Rajabhadar
Malcolm Edwards
C. B. Chengappa
A. Seshagiri Rao
K. Purushothama Rao
B. Coates
M. Subba Rao

Madras Ranger Lower Certificates.

Kunhiraman Menon	T. G. Seetharama Mudaliar
Behara Bagirathi	C. R. Thangavelu Moodaliar
Y. Venkataswami Naidu	T. V. Thayuman

In the course of his opening speech the Principal remarked "To-day is an historic occasion in the annals of the Forest Department of Madras, for our annual Prize giving is presided over for the first time by an Officer of our Service, the Chief Conservator, the Head of the Department. Since I entered the service nearly 28 years ago there has been no such momentous occurrence as Mr. Cox's appointment not even the starting of the Forest College 7 years ago, and it is up to all of us including you students, by loyal and devoted service to justify the step that places us on an equality with the other great Forest Provinces of India. I think Sir, you may rely with confidence on the College to serve you faithfully and to the best of its ability.

"The new era is again fortunate in its inception by the decision of His Excellency the Governor to assume the Forest Portfolio".

* * *

"Thanks to the greatly increased facilities now afforded in the Demonstration Forest, the Engineering Park (the apparatus of which has been so effectively extended by Mr. Crothers the Senior Engineering Instructor), the Arboretum, and the Sylvicultural models in the Museum, the students during Head-quarter terms spend at least 6 hours per week in Field Work *i. e.*, more than double the time previously possible. From the lecture room they are now able to go straight to the Field and apply (or at least to be tested in) the theories they are by

way of having imbibed. Freehand Drawing — a valuable accomplishment for a Forest Officer — has been encouraged on tour, and I also invite your attention to the Engineering Drawings (the work of the Students) that are hung round this room. A Student's drawings at the end of his course are now bound and sent to him. They form a more or less edifying record of his progress in this branch of the College course. But a Drawing of very exceptional merit may be retained and framed as a permanent adornment to the walls of the College. This privilege is jealously accorded and I hope proportionately appreciated.

"The Students' gardens, Fuel depot, Provision Stores, Badminton Courts, and improved Tennis Courts Athletic Ground and Pavilion, are innovations since last year that tend to render a sojourn more comfortable, sociable and healthy. The Government have given a generous contribution to the Students' Club, and a considerable number of Officers and of old students have already forwarded me subscriptions. If we get an adequate response I hope to have the work started within six weeks."

"As regards the Estate we are at great expense forming an ornamental Park round the College and by increasing the roads and paths, and by extending the borders and avenues we are endeavouring to convert a wilderness or a morass (according to the season of the year) into a habitable and pleasing property. But we can make no proper progress until we are provided with an adequate water supply — my feelings on the subject do not permit me to enlarge on this painful topic."

"The Athletic side of the College has maintained its average standard and has had a fair share of success. We *ought* to have won the Final of the Stanes Hockey Cup. That we did not was due to the lamentable fact that on the day we did'nt play well enough. We undoubtedly suffer from lack of expert coaching.

"The Tennis Courts are still not very good, but there is a lot of fun to be got out of them, and I hope that with the future support of *every* member of the Staff the Tennis and Athletic Club will enter on a new epoch of prosperity".

"The Senior Division as a whole is rather below the average this year; but there are no failures and no one anywhere near failing".

"And now Students, I have one or two things to say to you. By Mr. Dawson's departure next month you are losing a very good friend and I a devoted and loyal Colleague. For five years he has given the best of his ability and energy and much of his leisure to your interest and to your welfare, and he has been responsible for many of the improvements to your comfort and condition here. I do not remember his ever having been absent from duty while I have been Principal, but I do remember that he soldom came into my room in times of more or less pressure without some scheme for your moral or material advantage. I have always tried to see his point of view and when I have not been able to accept it you may have thereby sufferred loss, but the responsibility for the disability was mine — it was not due to Mr. Dawson's lack of eloquence on your behalf. You will, I know, join with me in wishing him good health and a happy life in his retirement. You may

bie sure that his thoughts in the future will be constantly with us here and with those of you who have shown yourselves responsive to his advice.

"In this matter of responsiveness to your environment of which I spoke to you last year I am glad to note a distinct improvement in the spirit of the College, as exemplified by your subscription of Rs. 5100 to the War Loan, by your efforts to work up your gardens, to write for the Magazine, to compete for the Indian Forester Prize and gererally to play up to the stimulus. Then again the excellent Gymnastic Show you put up on Saturday was an agreable revelation to many of us. But don't go away with the impression that you are arch-angels; you are far from that, although I believe that you are every one of you better fitted to become good citizens of the Empire then when you joined here; the Empire that within the last 48 hours has imposed the terms of a victorious peace on its unscrupulous foe. And yet what I dread most is that after you have left the College you may become a prey to your surroundings and may forget the one lesson that we have tried to teach you here-i. e. to do your bit. It is not doing your bit when I am told, by a Conservator or a District Forest Officer that such and such a man states that he cannot carry out a certain irksome job because he was never taught it at the College, when we here *know* that he was actually practised in that very task or in its own twin brother. It is not doing your bit to fail in Range Charge, or to spoil a fine Engineering project from the College by bad executions or because you happen at the College to have been trained into a good Athlete to neglect your professional duties for recreations. If it had not been for the defection and culpable laxity of a Past Student, who had a distinguished career here, we would by now have had the Students' Club nearly finished. It is just this subsequent failure of some of our most brilliant students that

fails me with poignant regret and makes me very chary in recommending Honours or Certificates in doubtful cases.

"We learn most from our own failures, and although the man that never makes mistakes never makes anything, that is no reason for making the same mistake twice.

"To their discredit there are three students in the College who are still unable to swim. One of them is a Junior. I hope the House Committee during the next touring season will complete his education in that accomplishment.

"On the whole the College reputation for endeavour is I am glad to say high and rising higher. It was very gratifying to receive not long ago an enquiry from the Inspector General of Forests as to whether we could supply two men for the Andaman Forest Department at a high salary. Unfortunately at present we have no private students, he only category available for such appointment—but the request was none the less pleasant hearing. Although it is not a very fashionable word just now I am proud to think that Efficiency (with a capital E) is still our ideal—and perhaps we may define Efficiency as the practice of doing to-day what we could much rather put off till to-morrow,—or the meeting of difficulties with Square Shoulders as one of you put it the other night at your very cheering entertainment which some of us had the privilege of attending.

"Students, the College does a good deal for you and I would ask you to do something for the College. You probably have very little idea of the amount of solid work Mr. Crothers as House Tutor has put in with the object of ensuring your comfort and welfare. With less efficient supervision I should be sorry to think of what his agents would make of your roads, your hotels and kitchens. To give some return

after you have left the College will not be very difficult. Send us contributions in kind for the Museum; remember that the Students' Club can only be built by cash and not by promises; write for the Magazine, and those of you who are Range Officers in the College Camps do your best to make us comfortable. Never forget the dignity of manual labour; you ought to know something about it by this time. Try and carry on the excellent system of Ryots' Conferences initiated by Mr. Dawson. You will in future be the *liaison* officers between the the Forests and the people—and it is by propaganda work that you can best serve your Commander-in-Chief and his Head quarters Staff. Above all remember that the name of the College rests with you and that your good work must be the basis of its reputation. I need hardly say how glad we shall always be to welcome you here. We are delighted to see the faces of so many old students to-day. It is perhaps primarily for the past students that we propose to give every year the Garden Party, from which this long sermon is detaining you. But I have had 23 years of making mistakes and I want to help you to avoid them as far as possible."

"Students I wish you God Speed."

The president then made the following interesting speech:

MR. COWLEY-BROWN, LADIES AND GENTLEMEN

It is a great regret to all of us that His Excellency the Governor is unable to be present to-day as he would have been had it not been for the Bellary tour. However it is but a pleasure deferred and Lord Willingdon will not only be here for the College Athletic Meeting in September but I hope will spend two or three days at the College and see the Students at their work. We will look forward to giving him a very hearty welcome.

"Turning now to Mr. Cowley-Brown's report I have to congratulate him once more on behalf of the Board of Visitors on his most capable and sympathetic management of the College. His enthusiasm is infectious and the Board is glad to see how well it is reflected in the general smartness and keenness of the students.

"I may add that the Board is specially impressed with the very great improvements that have been made to the Forest Estate. Much of the work has been done by the students themselves and a great deal of credit is due to the present Estate Overseer Mr. Ramaswamy.

"There are still urgent wants. The question of the water supply is a very serious one and must be tackled at once. Mr. Hart has very kindly met the Board of Visitors and the Principal during the past week and discussed the whole subject. As a result I think we can reasonably expect to have an efficient scheme of supply sanctioned by Government and put into operation within the next two or three months. Then we badly want a Students' Club and I echo all the Principal has said in his appeal for subscriptions. I should also like to see a Pavilion more worthy of the College. And the Tennis Courts require sheltering from the gentle breezes of Coimbatore such as we are now experiencing. Play on a day like this is rendered impossible unless some protection is provided.

"In the matter of educational standard, the Board of Visitors is of opinion that the College is at present somewhat below the average but on the other hand the Principal has been able to certify that he has never had a body of Students under him which has exhibited so much keen to learn or been admirably steady and disciplined in their work. That is a fact on which the Board desires to congratulate the College, and it considers that Mr. Crothers has been in this matter of valued support and assistance to the Principal.

THE
Madras Forest College Magazine.

Published Quarterly.

Vol. IV. September, 1919. No. 1.

Prize Day at the Madras Forest College.

On the 30th June this function was most successfully celebrated at the College, before the largest audience that has yet graced such occasions. In fact the house was full, long before the advertised hour and many had to stand or sit in the corridor outside "Gamble". It is understood that it is under contemplation to hold the gathering in future in the Gass Museum. The President of the Board of Visitors Mr. S. Cox, Chief Conservator of Forests, was supported on the platform by the members of the Board of Visitors (the four Conservators) of the Presidency, the Principal, the College staff and the Examiners.

Two students obtained Honors, 20 the Madras Ranger Higher Certificates and 8 the Madras Ranger Lower Certificates.

The Prize Winners were

Campbell-Walker Gold Medal	...	B. S. Chengappa
Brasier Gold Medal	...	Abdul Hamid

"With regard to "Athletics" there have been successes and failures; the College teams are handicapped by their long absences on tour. I should like to see the College win all its games. Perhaps you may think this an impossible ideal, but with Mr. Cornwell to coach you I hope you may go very near it next year.

"Mr. Cowley-Brown has not I think referred in his report, which of course deals with the past year, to a matter of considerable future interest to the College. By arrangement with the Government of India and with Provincial Governments, we are going to train in future considerable numbers of Government students from Bombay, Central Provinces Bihar and Orissa.

"It is our business to return these students not only well qualified for their future careers and a credit to the training at this College—that is a matter chiefly for the staff; but also to send them back with the pleasantest recollections of their life at this College—that is a matter chiefly in the hands of you, students.

I hope you will extend to these men your hospitality and good will and thereby increase the prestige and reputation of your own College throughout India.

"I think [illegible] to hear some details of a subject, which must often have been in your minds—the reorganisation of the Subordinate Forest Service. This is the scheme to take stands like this. Government have sanctioned the scheme to take stands like the current financial year and has allotted one lakh of Rupees during purpose. The total cost of the scheme is of course considerably that but for want of trained men it is not possible to introduce the whole scheme at once. The Conservators and I have been working at the details for some time past—it is a complicated business—but we hope

that by the 1st of October the scheme may be in force. Practically the whole of this year's allotment will go to the increase of pay of those now serving and I trust that will meet with your approval. All of us are delighted that the long promised improvement in the pay and prospects of the subordinate service has come at last.

"And now I should like to turn for a minute to more general subjects. Mr. Cowley-Brown has referred to the fact that for the first time in the History of the Madras Forest Department there is a Forest Officer at its head and has assured me, as that Officer of the cordial support of the College. Knowing Mr. Cowley-Brown as I have done for many years, I have never been in a moment's doubt of such support, but I am not the less grateful for the assurance. But in the few remarks which follow I want to take an entirely impersonal standpoint.

"The appointment of the Chief Conservator is the last step in a reform which has been in progress for a long time; whereby the technical management of this vast property of 21000 square miles of forest has gradually passed out of the hands of the Civil Service into that of the Forest Service.

"Previous steps have been, as most of you know, an alteration in the relations of the Collector and the District Forest Officer and a considerable increase in the latter's authority. The Conservators' powers have also been considerably increased and may, I hope, be further increased in the future. But the reform goes a good way further back than that. I remember that when I and some of those present to-day first came out to India, the position of the District Forest Officer was little better so far as the authority of his Office was concerned than a Head Clerk. He was undoubtedly viewed with great suspicion by Government. The Conservator then was merely an advi-

sing Officer whose advice was as often ignored as accepted. That is all ancient history and I only mention it to show how far we have since progressed.

"With this latest development I think we may say that the Madras Forest Department now stands on its own legs and I think it is a position on which we may legitimately congratulate ourselves. It shows at least that we have acquired the confidence of Government.

"But it is also a position which has its own reponsibilities and its own risks and I regret to have to say that we have still to acquire the confidence of the public.

"The position of the Department in relation to the ordinary village always seems to me to be much that of a school master to a school boy. The master imposes on the boy a number of rules and regulations which he intensely dislikes, and when doing so he tells the boy not only that it is for its good but that he will be very grateful for it when he reaches years of discretion. The boy does not believe a word of it; nor does the villager; and that is where our difficulty lies. The difficulty is moreover enhanced by the very long period which the villager will take to reach that of understanding maturity which I spoke of. It is a matter of time and patience and a great deal of both.

"But with educated classes the position ought to be quite different, but there we are up against the fact that we are very much out of touch with them. The educated classes either view the Department with indifference in dealing with so remote an interest as Forestry or when we do come into contact with them they are inclined to regard our motives with some suspicion.

"Want of sympathy for the poorer classes and a greed for revenue are often urged against us.

"Well, I do not propose to argue the points or to attempt a defence of the Department on this occasion; what I am interested in and wish strongly to emphasise is the necessity of making our achievements and aims better understood and removing some of the suspicion which clings to our motives. No doubt this is a difficult business but opportunities will occur if we look for them.

"Take the case of Working Plans. I see no reason why, when we are preparing Working Plans and especially those which deal with the supply of small timber and fuel or with grazing, why we should not call into council the educated opinion of the locality. We would place all the facts we have at their disposal, lay all we can do on the table, explain the difficulties and invite suggestion. No doubt we should not always get agreement; but we may get understanding and it is on understanding that confidence is acquired.

"I mentioned Working Plans and Mr. Cowley-Brown has referred to the admirable system of informal discussion with the local people introduced by Mr. Dawson into the camp routine of the students.

"Other opportunities I am sure can also be found if we look for them.

"It must be remembered in these democratic days that it is not sufficient to know that one is in the right—one has to convince the other man of the fact.

"So much for one of our responsibillities; now for one of the risks. The risk I am most anxious to remove is one referred to by Mr. Couchman at last year prize giving, the risk that under the new constitution the Forest Department may become self-centered, may try and plough a lonely furrow and may lose touch with the general District Administration.

"That I think would be one of the greatest misfortunes that could happen. We must remember that we are only a part of the great machine of Government and must harmonise our movements with the rest of the machinery.

Besides looking back on the past and especially the last ten years during which the Department has made great progress, I think one must be blind and ungrateful not to realise how much of our success has been due to the Civil Service and especially to Collectors by whose sympathy and co-operation we have turned many awkward corners.

"I am very glad to have the opportunity as head of the Department and a Forest Officer of acknowledging our indebtedness to the Civil Service and I know that I voice the general feeling of the whole service. Their co-operation in the future is more necessary to us than in the past and we must do all we can to retain it.

"Some of you know the special paragraph in the District Forest Annual Administration Reports entitled "Relations of Forest Officers with Revenue Officials"-or words to that effect. For many years past the only remarks I remember are "Satisfactory", or "Cordial" or "very cordial". Unless Government bored with the constant reiteration decides to cut the paragraph out of future reports, I hope we may not in our time break this record for monotony.

"One more word before I sit down. When the College meets again in August the familiar face of Mr. Dawson will be absent, as Mr. Cowley-Brown has informed you. I want on behalf of this large meeting of Forest Officers of all ranks to assure him of our very best wishes and hopes that he may long live to enjoy his retirement from active service.

"And now I think Mr. Principal, we may turn to the really important business of this meeting,—the Prize Giving."

On the conclusion of the Chief Conservator's speech the Principal requested Mrs. Cox to honour the College by presenting the Prizes to the successful students.

The company then proceeded to the Ornamental Park that is being formed round the College and to the strains of the Band of the Malabar Rifles partook of the hospitality of the Board of Visitors and the College Staff. A feature of the afternoon was a ceremonial dance by the Coorg students. Old students Messrs L. J. Taylor, Swami Kutti A. B. Fenn were present and the evening was devoted to happy informal reunions and social gatherings till far into the night.

The Variety Entertainment.

The students of the Madras Forest College gave a variety entertainment in honour of the Chief Conservator, The Principal and the Board of Visitors on June 26th night. The Chief Conservator, Mr. Cox, the Principal and Mrs. Cowley-Brown, Mr. Macqueen, the Board of Visitors, Mr. and Mrs. Wimbush, Mrs. Crothers, Mr. and Mrs. Holmes, Mr. Sathe Mr. Marshall, Mr. Venkataramana Ayyar and the Instructors were among the audience.

The entertainment consisted of two parts with 10 minutes interval between them. The first part began with a telugu song by student Subba Rao and was followed by "Transformations of Jack" by student A. Seshagiri Rao. The third number was a Coorg song by student M.B. Subbiah in the Coorg costume, and was followed by numerous recitations. "Hope of theory hopelessly ended" composed by student A Sesha-

footsteps of the House Tutor he blows out the light jumps into the bed and snores loudly. He is caught by the House Tutor who reports the matter to the Principal. Venkata Rao learns from the Senior Student Kodanda Rao that there is no excuse in the Forest College and that the House Tutor is doing him good by reporting the matter to the Principal. Venkata Rao is fined 8 conduct marks for keepinig the light after "lights out" and wakes up as if from a deep sleep when the senior student warns him that two years later these marks might be the descending factors between all honours and higher standard certificates. He then finds out the secret of 'Lights out' is to regulate his daily duties and feels himself quite happy as a result from consciousness of duty promptly discharged. He keeps himself going well enough to top the class and secures an Honours Certificate. He realises the importance of discipline and training of mind which leads to the end, efficiency, a state compounded of all the elements so properly and correctly mixed together as to make the nature stand itself and say to all the world that efficiency makes a man a man. He honestly hopes that every night he will be able to sound his own "lights out."

The Chief Conservator and the Board of Visitors expressed their appreciation of the Variety entertainment, with a special stress of satisfaction on the development of the last scene 'Lights out.'

Students Seshagiri Rao, Umapathi, Abdul Rahiman and Joseph showed that they possessed histrionic talent of no mean order. The evening was thoroughly enjoyed and showed quite a new light on the capacity of several students besides those mentioned above.

We append the programme.

Programme.

Variety Entertainment by the Madras Forest College Students.

1.	Song (*Telugu*),	...	M. Subba Rao.
2.	Transformation of Jack (*Impersonation*)	...	A. Seshagiri Rao.
3.	Song (*Coorg*),	...	M. B. Subbiah.
4.	Fencing and Club Swinging	...	Krishna Rao.
5.	Hopes of Theory hopelessly ended (*Recitation*)	...	C. L. Narayan Rao.
6.	Shararuth.	Side spitting Force :—	
1.	Callitela Chetty	A wealthy merchant	M. Umapathi.
2.	Shararuth	A servant boy	Abdul Rahiman
3.	Nazeath Khan	A friend of the Chetty	Seshagiri Rao.
4.	An illiterate man		Narayana Rao.
5.	Mr. Crack	A friend of Shararuth slightly demeated	Muliyil.

Clerks, Peons &c,

INTERVAL 10 MINUTES.

1.	The Hidden Sword (*Mondogue*)	A Seshagiri Rao.
2.	The Logician (*Dialogue*)	A. Joseph and Umapathi
3.	The Magic seat.	
4.	Lights out. (*A sketch of life at the Madras Forest College*).	

		Time.
ACT I.	A room in the Hostel	1—30 p. m.
ACT II.	Scene the same	3—45 p. m.
ACT III.	...	9—40 p. m.
ACT IV.	...	6—50 p. m.
ACT V.	...	8 p. m.
ACT VI.	...	2—30 p. m.
ACT VII.	...	6 p. m.

Final Scenes, Time 8 p. m.

it is only by thoroughly organising, either personally or through an implicit obedience of his orders, all works in charge of or connected with the Forest Guard, that a Range Officer can hope to exercise any sort of control over his men.

It is a pity that, apart from charge-sheeting and submitting with his remarks the charge-sheet to the District Forest Officer, for orders, the Range Officer has no further power over his Forest Guard. This may seem a trivial matter, but it is surprising what the moral effect on a man is, who knows that his superior can make or break him. As it is, he knows that apart from charge-sheeting him, the Range Officer can take no further action, and he trusts to luck, that the District Forest Officer, who seldom has a very intimate knowledge of the actual state of affairs, will take a lenint view of his case. To return to the point however, the first essential to properly control yoru Forest Guard is to provide him with a map of his beat. This should show in detail, all the areas, fuel, timber, bamboos etc, which are in his charge. The limits of each individual working circle should be marked off in different coloured inks on the plan, and personally pointed out to the Forest Guard on the ground, by the Range Officer. This will make him realise his responsibility, and prevent his pleading ignorance, for any irregularities which may be noticed later on.

At the begining of each month, a definite programme of work, should be assigned to each Forest Guard, and he should be directed to submit with each week's diary, a statement in tabular form showing the progress made in each work, during the week. This is one of the surest ways of controlling and exercising, any sort of check over his work. Periodical inspections, of the records, stores and other Government articles in his charge, is also an essential to proper control, and will result, not only in the Range Officer gaining a more intimate knowledge

of the Forest Guard and his work, but will also train the Forest Gu[mes] to be methodical and systematic in his habtis. [per] [ace]

Though it is possible for a Range officer to effect a proper cont[ie] of his Forest Guard in his work, it is quite a different matter wher[int] comes to the question of controlling his morals. [ry] [st]

That Corruption is synonymous with the Forest department, wh[rs] applied to the lower subordinates of the service, is an undisputed trut[ts] and in view of the fact that the pay they draw is hardly sufficient t keep them in food for the month, it is hardly surprising. Their mod of corruption assumes various forms, the most characteristic of which ar[e] bribery, and the swindling of Government money. That the Depart ment is in some measure to blame for this, there is no manner of doubt and as long as it maintains it policy of deriving as much Revenue as possible from its Forests, with the least possible expenditure, it will I am afraid be futile to attempt to solve the problem as to how to prevent corruption.

There is not in my experience a single department, where the work is of as strenuous and taxing a nature as in the Forest Department and it is only in fairness to its members, that they should be as well, if not better paid, than the corresponding grade of men of the other departments, This however is not the case. The Department would lose nothing by sanctioning an all round increase of pay to its subordinates, and the system of rewards for all cases detected, as at present in vogue in the salt and Abkari Department, would be a splendid incentive for the Subordinates to report all bona-fide cases, instead of receiving a bribe and hushing them up, as I am sure is at present being done.

giri Rao, the last event of the first part, was a comic play in one act called "Shararat" written by student A. Rahiman. Student M. Umapathi Mudaliar personated the fat chetty quite fittingly both in person and in action. A. Rahiman acted the part of Shararat and Seshagiri Rao the part of Najit Khan and dear friend of the Chetty. The mischievous boy Shararat is brought as a servant by Najit Khan to the Chetty who engages him. The boy sticks to the very words of Najit Khan to feed his mischievous tendency and keeps on with his humour till he was able to carry away some money from the cash box of the Chetty.

After ten minutes interval the second part opened with the "Hidden sword" a monologue acted by A. Seshagiri Rao. The hidden sword is the hidden money of a miser who called himself a patriot without giving a penny for the war. Two doctors devise a plan to make use of the sword by falsely poisoning the miser. They succeed in their desire and keep the sword bright by using it.

The next item was the wonderful power of a Logician who could prove anything and everything in the person of student A. Joseph.

The last number of the second part was the "Lights on" a sketch of the life of a student in the Madras Forest College written by A. Seshagiri Rao under the inspiration and suggestion of the House Tutor Mr. Crothers who finally shaped and completed the sketch. The play is in one act and it consisted only of 2 characters, a junior student and a senior student, the former being personated by A. Seshagiri Rao and the latter by M. Umapathi Mudaliar.

The summary of the play is as follows: The junior student on the first day of his College course finds himself mystified at the number and size of books to be read, rules to be promptly followed and the "lights out" at 10 p. m. He acts like a baby that had just come out into the world and he has to be taught every thing by the well experienced senior student, even the proper wearing of the College uniform. He becomes hopelessly confused as soon as he hears the bugle. Being unable to regulate his daily duties he was surprised to find that the bugle sounded 'light out' when he calls his servant Raman for dinner. He foolishly lays utmost importance on the telegram requiring his presence on the occasion of his grand mother's cousin sister's marriage and applies for leave in spite of the sound advice of the senior student to act otherwise.

The arrival of the milk cart being late he becomes restless and the senior student pacifies him by directing his attention to the 9-25 a. m. interval when he can have his coffee.

He feels himself very much disgusted when the Principal refuses to give him leave and tells him that he must take life much more seriously, his work should have his undivided attention and it is nonsense to expect to be permitted to be away 6 days to witness the marrriage of his grandmother's cousin's sister.

The senior student advises him to have a spin on the cycle to clear his mind and to dispel the miserable feeling. Accordingly Venkata Rao the junior student goes out for a cycle ride. While going down a declivity at a light velocity his cycle bumps against a stone and he loses his equilibrium and falls upon a macadamised road. The Senior student tells him that he would not have lost his centre of gravity if he has developed the forest eye which means the quickness of observation.

Venkata Rao with determination keeps his light burning after the bugle has sounded for "lights out" and begins to read. Hearing the

* "Forest Guards, their Recruitment and control; Corruption of Lower Forest Subordinates, and how to prevent it."

—o—

The contemplated re-organisation of the lower subordinate staff of the Forest department by Government, ought, if followed upon proper lines, to go a long way, towards dispelling, the bad impression of the department, that exists in the minds of the Public.

That this impression has been created, chiefly through the depradations of our Forest Guards it is not difficult to understand, and the sooner the cause of it is removed, the better for the department in general.

"Give a dog a bad name and you might as well hang him". Well the Forest Guards of this Presidency have earned the bad name, and as we cannot very well hang them, we might resort to the more gentle expedient of gradually getting rid of them, at any rate, of the undesirables, for I must admit that there are exceptions, though they form a very small minority.

Under the re-organised scheme, the Forest Guard will apparently be started on a salary of Rupees twelve per mensem, with prospects of rising to the appointment of a *Deputy Ranger*. The mere raising of the scale of pay, will certainly have no material effect on the moral of the Forest Guard, if the present type of men are kept on, They belong to a class, which think nothing of corruption and in the majority of cases their chief aim in joining the department, is to make as much money as possible, before they either leave or are sent out, and as I have said before, the only way to remedy this, is, when the scheme comes into force, to gradually get rid of this type of men.

[* Indian Forester Prize essay by past student Mr. L. J. Taylor, the winner.]

Where then are we going to get our recruits from? comes the question.

Well in indicating the lines on which I think we ought to move, I shall endeavour to frame an answer to that question.

A salary of Rupees twelve a month, is certainly not much, but the prospect of rising up to Rupees forty, is I fancy, a sufficient inducement, to attract, a fairly respectable class of people to accept it.

Youths with a school final qualification jump at the chance of a clerk's appointment on Rupees fifteen or twenty, which is usually a life of drudgery, with little or no prospects before them, and I am sure that this same type of youth will readily join up as a Forest Guard on Rupees twelve, if only the Forest Department took adequate steps to advertise the prospects of the appointment in a proper manner. If the Forest Department does this, and succeeds in securing its recruits, it has then got to see that it keeps 'its' part of the bargain in view, namely, the prospects of the men. To ensure this, direct appointments of Deputy Rangers and Foresters should cease, or at any rate be reduced to a minimum, and if any vacancies occur, they should be given to the deserving Foresters and Forest Guards respectively. By indiscriminate direct appointments, the Forest Department, will not only fail in its part of the contract but will also cause dissention amongst the men and block grade to grade promotions.

Having now settled on the recruitment of our Forest Guard, the question arises, how to control him?

As his direct superior this work devolves solely on the Range Officer. With the limited powers assigned to him, the work of control calls for a great deal of tact, and more so of patience to be effective, and

The swindling of Government money is in great part due to the im
y sanctions accorded for all Forest works. Compared with the rates wi
nctioned in other departments the Forest rates are surprisingly low so
d unless this is immediately remedied, the subordinates will have no
, but to false their accounts. They know that they cannot pay all the
bour they get, at full rates, and so they don't pay at all. and
mpensate the coolies from our Forests. This evil can be mitigated
y the Range officer making payments himself as far as possible, but a
Entre nous,' I fancy the Range officer knows how the land lies, and lets well abone. In any case it is practically impossible to do this in a heavy i
Range.

What there is wanted is a more generous return by the depart-
ment for the Revenue it derives from its Forests, not only to the forests by providing more adequate sanctions for work of improvement in them, but also to its staff, who toil to bring about these improvements.

" FIDE ET LABORE."

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* "In its Forests lies the heart of a Nation and a people without Forests is very close to extinction

—o—

The world today is wiser than what it was yesterday and yet we do meet so many of our fellows who are less acquainted if not thoroughly ignorant of the importance of the existence of Forests which supply their own needs and the requirements of people and a nation. Timber, fuel and such other Forest products are utilized by them freely and without consideration. They see acres on acres of naturally stocked Forests and they meet their requirements without difficulty. They

* Indian Forester Prize essay by present student, E. S. WAMBECK, the winner.

hardly understand that those forests will deteriorate and that they nes
cease to be Forests any more. They fell and hack, use and waste up per
time comes when in the light of realisation of their thoughtless folly, co
becomes too late to mend ; our Forests therefore should be looked aft ie
and in this essay it shall be my endeavour to briefly and within tint
limited number of words explain those nineteen weighty words whicry
from the subject of this essay. st

A nation we know has its two sides, peace & war. By peace rs
mean, the tranquil state of a nation, having industry, commerce, increase s
and plenty on one side & consumption & waste of vast & varied resources
on the other. These few years had our minds occupied with stories of
the great war & we have seen to our great realisation that victory was
with the army whose country had the greatest iron mines, the largest
areas of waving grain and an abundance of wood. Of all the products of
the soil upon which the very life of a nation depends in times of war,
wood is the only one that cannot be rapidly increased under necessity
and by the employment of adequate labour. Therefore provision for
adequate national defence necessitates the maintinance of vast resources
of timber throughout the nation, resources from which billions of feet
can be drawn in a single year to meet the various demands of a nation,
its army and its navy.

A sane and conservative development of Forest resources to meet the needs of a nation in times of peace necessitates a constantly increasing intensity of management of all absolute Forest land and the building up and maintenance of an enormous Forest Capital. It is good to remember that this Forest Capital can be drawn upon in times of war and may determine the fate of the nation. A Forest Capital far beyond that of former days, will not only add to her economic development in times of peace, but be developed and maintained to better insure her against vital needs in times of possible future strife.

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H
ve
ything like so wide spread an influence as the Forest, that so intim-
ely touches the daily life of so many persons in so many ways ; and
ow we have learnt in this great world war that the nation having
within its boundaries Forests adequate to supply the excessive demands
f war, without completely jeopardizing the needs that must necessarily
rise during the period of reconstruction after the war clouds drift away
s not only stronger in war, but necessarily must be stronger in the
up-building of the nation.

The success of a nation will depend on the economic development
her non-agricultural lands for the production of timber. Without
ber in abundance, a nation would be to-day like a giant without
ns. I beg you to remember that scarcely an article of commerce is
duced or brought to its point of utilisation without the use of wood
some process of its production, manufacture or transportation. We

This great world war has shown us more clearly than here-to-fore the great importance of Forest conservation. It is giving us a new light, it is showing us the great need of the Forest in national defence. In time our virgin Forests with their vast resources will disappear. With their disappearance are we to lose this important asset in times of peace and indispensable asset in times of war or are we to keep our vast Forest property intact by protecting it ever by organising our absolute Forest land for successive crops of timber as our virgin lands disappear ?

Forestry is defined in its expression. It is what the public wills it to be. Its movement forward into what it ought to be in order to best serve the public both in times of peace or times of war, is attained by all of us thinking about the right thing to do with our forests until we want to do the right thing. Then if we do the right thing long

enough it is a perfectly natural consequence that good forestry becomes the gift of each generation to succeeding ones. In this gift & the proper handling of it depends the wealth of a peace-loving nation. Peace promotes prosperity ; & how is this to be attained unless the people want to work for it? Forests give rise to many industries in the point of utilizing its varied products. Its transporation in & out of a country sets up commerce. This is not all in all the outcome of a Forest conservance and without Forests roads will be washed away, and rivers dried up ; hence reduced transport ; there are many more benefits derivable from it on the proper exercise of Forestry.

As it stands the forest Capital of all Europe will however be enormously cut into now that the fighting is over and the not over-abundant forest resources of the rest of the world will be required to rebuild Europe. These lessons of the great war that so clearly show the necessity of Forests for the existence of national life should be taken to heart by the people of every or any nation, more so by those of India and her neighbours. A nation would hardly be cognisant of the importance of the existence and maintainance of vast forest lands unless the people took to heart the great necessity of such reserves ; for it goes without saying that a people make a nation.

Now shall I show how that the existence and resources of a Forest go to make or mar the progress of a people. Let us first consider an individual self, man. How does a Forest directly affect him? Certainly by all the utilizable major produce or wood extracted from it, such as firewood for domestic purposes, building timber to protect him from the ravages of the elements of the sky and transport vehicles for carriage either by land or water. These besides multifarious other uses to which wood is put in some form or other, are as essential to man as the air he

breathes; all produce other than timber and fuel is known as minor Forest produce, and it will easily be understood that the term comprises a great variety of articles such as barks, seeds, leaves, fruits grass, canes, honey, wax etc and their bye-products Several of these materials play an important part in small farming especially in poor countries, while others furnish the raw material for extensive industries. Thus Forests form objects of industry which necessarily involve capital, labour etc. the special qualities of timber therefore that render it all important in daily life may perhaps be best understood if we consider the demands made on wood in the living tree which is exposed to various vicissitudes during its prolonged existence: when disintegrated it yields fibres that provide paper and cordage, while as a chemical complex wood is a fuel, and a source of substances as diverse as charcoal, alcohol, acetone, Formalin, artificial silk, turpentine, dyes, scents, tars, acids and drugs new uses for wood are constantly being discovered and old uses being increased, so that with the advance of civilization the consumption for timber per head of population steadily rises, despite its replacement for certain purposes by other materials such as iron and ferro-concrete. Hence here and in the whole of the British Empire we know that there will be an ever widening demand for timber.

We now recognise the direct use of a Forest on individual life the indirect effects of a forest though perhaps un-noticeable yet render life easy, bright and worth living. The forests with their more or less physical properties modify the humidity of the air and the temparature of the soil and regulate precipitation and evaporation. The protection against air currents and of the soil, the feeding and maintenance of springs and rivers form the mechanical effects of forest. Its hygenic and aesthetic effects are further beneficial to man. Each of these various advantages derived from the existence of forests, especially those directly

concerned, we have had practical experience of some time during our daily life. The indirect effects though inconcievable to the villager is more the less important; water for instance as we all know is an indispensable element in every branch of life. It is essential for the life sustenance of a people and every individual. It gives power to drive machinery where other means of working is difficult and expensive to procure. Irrigation and agricultural pursuits are rendered impossible without it. This all important factor, water, should therefore be preserved and its supply maintained; and this rests wholly with the Forests of a country to do it. How? To be clear let me here explain what a forest soil is. Unlike bare and agricultural lands the soil in a forest is invariably covered with a thick matting of humus, litter and other decomposed vegetable matter. On a shower of rain this acts just like a blotting paper or a sponge. It sucks up all the water, retains it, and gradually gives it up through percolation towards the feeding of springs, rivers and other perenniel streams. This is how a continued and sustained maintenance of water supply is obtained. To wander away from the point for a minute, let us suppose that all the hill tops of a country were cleared of vegetation. What happens? the rain falls, the water rushes down into streams or rivers and is deposited in the sea, very often causing erosion, landslips and such other damages which may be fatal to villages or towns lying in the plains and their neighbourhood. There is very little percolation and the country suffers with a scarcity of water; crops fail, and famine comes in with all its horrors. The fact that a forest holds such responsibility with regard to the water supply to the springs in it was forgotten. Lands were cleared for plantations of different kinds and consequently the springs in them dried up and the climate became severe. Preventative measures against calamities of the like, were taken up by some governments as also by private land owners. Ceylon to day has a reservation of ½ to 2 chains of forest cover on either bank of a river

stream or spring according to its size. The result of such reservation as against the old system of clearfelling has opened the eyes of the ignorant villager and he is now careful of the treatment of any springs or rivers found in his land.

Forest lands over an elevation of 4000′ are also possibly reserved to induce precipitation. Forests also provide shelter for game.

We now clearly understand how that the non-existence of Forests would vitally affect man in his life career; & should we say that Forests are essential to a people, a people without Forest are very close to extinction? If in its people lies the wealth & fortitude of a nation, surely in its Forests should lie also the heart of a nation; then should our slogan be 'make the land productive' this slogan should sing from every heart & every organisation that is striving for the betterment of man the individual, a people the part & the nation.

'Nil desparandum,
Labor Omnia Vincit.'

A defoliator.

As one would imagine from a cursory inspection of the Madras Forest College estate, the black cotton soil is not the monopoly of Acacia arabica alone. Of the numerous species of plants, Ailanthus excelsa is one, found, dotted about in the estate; it is impossible to go wrong in the identification of this plant, if it is borne in mind that it has a grey bark, with numerous similarly coloured scars, the result of the shedding

of its huge leaves with a pulvinate base. The leaf is pinnately compound and the main rachis is about 3-4 ft. long with 12-14 pairs of leaflets 2″—2½″ × 4″—5.″

In February a certain larva was seen feeding on these leaves and in the month of March these had disappeared, leaving the plants almost defoliated with only the main rachis sticking to the stem, to remind one of their destructive work.

Often had I occasion to pass by these plants subsequently, but not once did I see anything more than what looked to all appearance leaf-scars close to one another on the stem. It so happened that on the 8th March, while bending a branch of Acacia arabica for pruning, there came a shrill sound 'Kich, kich kich.' Not knowing whence it came, to look out for the agent of my surprise, I let go the branch. The sound stopped with the rebounding of the branch and I looked about, all in vain. Notwithstanding the disappointment I bent the branch again and with its end went on striking at every plant around and searched in the cracks and crevice in the black cotton soil. Once more came forth the 'kich, kich' and this time from an Ailanthus excelsa plant. I stooped down to examine, only to find the apparent leaf scars no longer scars but only cocoon (very cleverly constructed, indeed, so as to completely resemble scars on the stem) the least disturbance of which excited the insect, inside, to produce the shrill 'kich, kich.' This appeared to me strange and my curiosity prompted me to cut a portion of the stem with these cocoons off the plant and keep it under observation. In the absence of my breeding apparatus, I put the branch in an open mouthed bottle and let it remain. I had not long to wait. On the 11th morning, I took out the bottle, only to see pretty looking winged insects come out of the cocoons and on the look out for a way to escape.

Any word other than 'pretty' would not be the most appropriate for these which possessed such beautiful colours, as grey, brown, mottled with black specks in the head, chest, forelegs, bright yellow and not without black dots in the abdomen and the remaining legs, the hind wing with a black apical area. What was most striking and which made them really pretty, were the grey brown fore wingswith an olive tinged margin. I took these to the Gass Museum, where, a fine collection of moths and butterflies is kept and there, after careful comparison I found this to be *Eligma narcissus*, moth of the order *Lepidoptera* sub family *Lithosinea*.

Beauty is not all that is required considering the harm these moths do; should the desire be the complete destruction of these in favour of the encouragement of Ailanthus plant it is easily accomplised by exposing the insects when, in the cocoon with a bamboo or any simple stick.

B. S. CHENGAPPAH.

[This interesting record of a student's powers of observation will, we hope, form an encouragement to other students to note and follow up systematically, phenomena met with. Patient scrutiny of apparent trifles is the secret of discovery and original research—EDITOR.]

Sandalwood Observation areas.

NAMAKAL RANGE.

There are 2 sandalwood observation areas in Namakal range, both being situated in an unreserve in Valappurnad—elevation about 3500', Soil of loamy sand with disintegrated gravel below, and with a westerly aspect. Fairly thick growth of Sandal occurs on the area, the chief among tree associates being, Canthium didymum, Albizzia Lebbek, Albizzia odoratissima, and Phyllanthus Emblica. Among undergrowth we have Zizyphus œnoplæa, Cipadessa fruticosa, Toddalia aculeata, Dodonæa viscosa Cæsalpinia Bonducella and Hiptagé madablota. One of these observation areas was opened on 27th April 1916 and 193 Sandal trees were enumerated in it; the other area was opened on 14th October '16 and 158 trees were enumerated in it. Area no. I was chosen as an area containing spiked trees, there were 19 spiked trees in it on 27-4-16. The observations here were mainly with regard to the date on which each tree was first observed to be spiked and the date of its death. Between 27-4-16 and 20-8-17, 16 of the healthy trees got spiked on various dates as follows:—3 trees were observed to be spiked on 29-7-16, 1 on 29-9-16, 1 on 27-11-16, 2 on 20-5-17, 1 on 22-5-17, 1 on 12-6-17, 1 on 20-7-17, 3 on 12-8-17 and 3 on 19-8-17. Monthly observations were being made which ceased on 20-8-17 and were resumed on 29-8-18; on the latter date, 8 more of the healthy trees were noticed to have been spiked. Between 27-4-16 and 29-8-18, 10 sandal trees were found to be dead, 9 of which were spiked trees and the remaining one was a healthy tree. Of the 9 spiked trees that died, 4 were already spiked at the time of opening the observation area. The remaining 5 were those that got spiked after 27-4-16. As may be seen from the following figures, spiked trees have died a year after getting affected with the disease, the exact period varying from 12 months 2 days to 12 months 23 days. The following table gives some particulars of the identical trees from whose history the above deduction was made.

No. of the tree.	Date on which the tree was first observed to be spiked.	Date of death of the tree.	Time taken by the tree to die.		Dates of observation if any between the Periods noted in cols: 2 & 3.
1	2	3	4		5
			Months.	days.	
104	29—7—16	12—8—17	12	14	29—9—16 & 22—5—17
110	12—8—17	29—8—18	12	18	Nil.
111	12—8—17	29—8—18	12	18	Nil.
178	27—4—16	20—5—17	12	23	20—11—16 & 12—1—17
193	27—4—16	29—4—17	12	2	29—7—16 29—9—16 29—11—16 & 25—3—17

Observations have to be made on a larger number of trees before any definite conclusions can be drawn. Observations so far made tend to show that spike is not active during the months December to April, both inclusive and that a spiked tree takes a year to die. The girths of the trees are not available on record and as the tar numbers on the trees have disappeared owing to efflux of time it is not possible to get the information now.

2. Area No. II "was specially chosen higher up the hill *devoid of spike* to see if spike was travelling upwards as well as downwards." On 29—8—18, 2 of the healthy trees had *just got* spiked in this area. On 3—12—18, the number of spiked trees rose to 10, on 22—2—19, the number was 11 and on 22—3—19 it was 12 at which figure it remained stationary on 25—4—19. I have particularly noticed in this area that in the case of newly attacked trees, *the lowest branches* get affected first; this directly contradicts the statements in Page 142 Vol. III of the Madras Forest College Magazine by Junior student K. P. Chathu Nair that in Denkanikota "the first attack of spike is always noticed to appear on the very top of the tree and gradually develops downwards until layers of branches get infected." In the observation area no. II in my range I have observed in the case of 2 trees, the first attack of spike appearing in the lower branches. This shows the necessity for making observations with regard to the same matter in different localities with different environments. The observations made in this area show that spike spreads upwards as well as downwards. A large scale map of the area shows that spike has been spreading in all directions, though there is an apparent tendency to spread more rapidly downwards than in other directions.

3. The disease has spread far and wide on the Namakal-kollimalais. The most richly stocked area of the range is badly over—run by this devastating disease. Saplings appear to catch the disease quickly; over 2000 spiked trees are marked this year of which well over 75% is below 12" in girth. These will be soon extracted or cut back. There are no seedlings to take their place. The prospect is dim. Should areas where spiked trees are felled to prevent spread of the disease be artificially regenerated with sandal? It may be argued that such areas being susceptible to spike, the sandal that comes up there under artificial regeneration is liable to get attacked with the disease in course of time. But

if steps are not taken to ensure that healthy seedlings take the place of the rapidly disappearing spiked trees, will not our forests be eventually depleted of sandal areas?—*quod avertat Deuo.*

Namakal,
11th June '19

S. G. VENKATARAMANA IYER,
Forest Range Officer.

Forestry as a Vocation.

BY H. H. CHAPMAN.

With the return of nearly two million young men from the trenches and the varied activities of military life in France, comes a heightened interest in forms of outdoor employment. The appeal of forestry as a vocation has always drawn a class of young Americans whose love of the woods and of the hardships of the trail is combined with a desire for public service for scientific achievement, and for clean, practical effort.

Probably no profession holds a greater lure for those who rebel against the confinement of indoor occupations and have a genuine love for the woods and mountains, yet no calling is so little understood in America to-day as this modern vocation of forestry.

Forestry is the art of maintaining forests for the benefit of mankind. It is, first and foremost, a *land* question, for forests are the product of forest soils. Since forests as such must occupy land to the exclusion of agricultural crops or of fruit trees, forestry is based on the proper segregation of lands into the two fundamental classes, agricultural

lands and forest lands. The forester's vocation usually excludes agriculture, but he is frequently called on, in co-operation with agricultural and soil experts, to conduct these land classifications. For this reason, a knowledge of farming is of great value to the forester.

The status of the land once determined, the forester's object is so to manage these forest areas that the greatest possible sum or combination of benefits may accrue to the communities dependent on them. These benefits are threefold. First, may be mentioned the use of the forest for recreation. This use has the widest appeal to sentiment, and is invaluable for maintaining health of body and mind for our increasing population of city dwellers. Areas set aside *exclusively* for this use are known not as "forests" but as parks and while the foresters as such can perform invaluable services in protecting the forest from fire, insects, diseases, and other enemies, he cannot here bring into play the full exercise of his abilities, for this includes the cutting and utilization of timber which is usually prohibited on such areas. The care and preservation of game, a specialty in which the forester is profoundly interested, will find its fullest development on large park areas.

The second great benefit from forest areas is the protection they afford to our soils and water supplies. Perhaps this is the best-known and best-understood function of a forest cover. In maintaining the flow of springs, in preventing the erosion of surface and the silting up of rivers in reducing floods and prolonging the flow of streams in dry periods, the maintenance of forest cover is essential. Here, again, the forester's function is the protection of existing forests. But both in parks and protection forests there is the frequent necessity of re-establishing by artificial means the forest cover on slopes denuded by fire or by destructive lumbering. In this latter role the forester must be a tree

planter and must get his results, not as the ornamental nurseryman does, by pampering the individual plant, but on a large scale, w[illegible] all stock, at minimum expense, and in competition with such de[illegible]e forces of nature as drought, wind, insect pests, rodents, frost, snow, and grazing animals.

But the real art of the forester lies in the management of the forest for the continuous production of wood in all its forms. Wood must serve us in many capacities, such as for fuel, buildings, furniture, paper, vehicles, and so on in an ever-widening circle. It cannot do so unless trees are cut, logged, transported, manufactured, and laid in a finished form at the door of the consumer. The cutting down of mature forests is necessary to the comfort and well-being of the very individual who declaims against this destruction because of his sentimental regard for the forest in its natural state. The lumberman has built up an enormous business whose exclusive concern is to supply the economic demand for wood products by taking from the forest the raw product of nature, the mature tree, and converting it into lumber from which by other processes finished products are made. It is not the business of the lumberman, as such, to do more than this. And as long as the supply of virgin timber holds out in America, the lumberman will continue to draw upon it as if it were inexhaustible. His business begins with the felling of the trees; the forester's business, as such, sees its completion in the same process. Forestry precedes and underlies the lumbering of the future. The true business of the forester is to grow the timber which ultimately finds its way into the economic life of the nation. Just as one agricultural crop must be harvested before another is grown, so a mature crop of trees must be cut before a young, vigorous second growth can appear. The forester's art is so to cut this timber that the forest will reproduce the most valuable species. Only by accident does this result occur naturally, following the operations of modern

logging, and it never happens more than once on the same site. The worthless brush and forest weeds which spring up so frequently on old cuttings have about as much resemblance to commercial forests as thistles have to wheat. They are both green in season! Not that the lumberman cannot manage his lands as forests should be managed if he sets out to do so, but that he too often has no interest in the land itself except to get rid of it as soon as the mature timber is cut. He owns it in order to assure to his business an early supply of raw materials, wood.

The forester, then, is one who manages forest land for the purpose of growing trees and maintaining the productivity of the soil and of the forest. Do lumbermen employ foresters? They have need of timber cruisers to estimate the volume of their merchantable timber, of logging engineers to lay out their railroads and logging operations, of woods foremen to superintend the logging, and of inspectors to secure close utilization of the tree. There are many opening along these lines, as well as in the milling, manufacturing, and selling end of the business, but none of these is forestry, however *essential to forestry* these operations are. When the lumberman, as a land owner, adopts the policy of reproduction and growth of trees, and sets out to retain indefinitely the ownership of cut over land for the possible future revenue obtainable from such management, then the forester will find an opportunity to practice his true vocation as manager of such tracts. His education as a forester may fit him meanwhile for useful employment along these kindred lines. In other words, the character of land ownership and the purpose of the owners determine whether the work of the forester constitutes the practice of his vocation or of some other line associated with lumbering or manufacturing. The man who worked in the French forests with the forestry regiments can bear witness to the

truth of this statement. For over there, about half of the forested areas are publicly owned and on the rest, the private owners have practised forestry for decades, even for centuries; otherwise there would be no French forests! Every acre of these forests, no matter how owned, has been produced directly by the art of the forester; and the French forests saved French as truly as did the American Army.

In America, due directly to our superabundance of virgin timber. private owners, as a class, could not afford and did not care to undertake the expense of producing timber; the competition with virgin forests prevented it. So it has come about that forestry and employment for foresters as such, has developed principally on the National forests under the United States Forest Service., which controls 155 millions acres of public lands set aside for timber production. The Forest Service employs over 2,500 forest rangers and officials of higher grade. At present, the larger number of men is taken into the Service as rangers after their passing an examination to secure Civil Service rating. This examination is given annually, in the fall, and is based upon familiarity with certain essentials of the work of a ranger, such as compass, surveying, handling, small timber sales, the administration of grazing for forest users, fire fighting trail or road building, packing supplies, and making out reports. Western experience counts for much, and before taking the examination it is customary for an applicant to seek a position as forest guard, fire lookout, or "temporary" ranger during the season preceding the examination. Applications for such employment may be made to the District Foresters at San Francisco, California; Portland, Oregon; Missoula, Montana; Ogden, Utah; Denver, Colorado, or Albuquerque, New Mexico. These positions pay a salary of $ 1,100 increasing by promotion to a maximum of $ 1,500. Many rangers have only a common school education, but the opportunity for advancement beyond this grade is largely determined, first, by

the amount of additional education possessed by the rangers, ranked in order as graduates of high school, college, or technical school of forestry; second, by their character and ability to master the work, take responsibility, exercise initiative, and become good executives. The second method of entrance into the Forest Service is by passing a highly technical examination for the Civil Service grade of Forest Assistant. This requires a complete course of training at a technical school of forestry, equivalent to a 4—year college course with one year of post-graduate work. The Forest Assistant is frequently assigned to ranger work on entering the Service. The benefits of entering the Service as Forest Assistant lie largely in the educational training obtained previous to employment. Forest Assistants are also given work in reaesrch at Forest Experiment stations, in timber-sale administration, timber estimating, grazing inspection, and general administrative work. If they show adaptability and character, they, as well as rangers, may become Forest Supervisors at salaries from $ 1800 to $ 2400 or eventually may obtain higher executive positions paying up to $ 3600 in the District Offices or at Washington.

Certain States, as New York and Pennsylvania, which own large areas of land set aside as State forests, employ foresters. Pennsylvania educates her own State foresters at the Forest Academy of Mont Alto. New York here by Civil Service Examinations in technical forestry.

The employment of foresters by owners of private lands will steadily increase from now on as land owners begin to realise that non-agricultural land can be made to yield an income in no other way. Paper companies, with millions invested in plants, are apt to desire a permanent output from their spruce lands, and they employ foresters to secure this end. Mining companies in regions where the supply of virgin timber is nearing exhaustion are taking an interest in forestry and foresters.

Owners of large estates composed of woodland, and institutions with ferest lands are realizing the need of employing foresters properly to care for their properties.

A host of small land owners exists such as farmers or owners of small estates, who can and should practise forestry on woodlots and waste places. These tracts are not large enough to justify employing a trained forester. To supply the wants of these owners, States have, established forestry departments for public education in forestry, as well as to secure fire protection on forest lands. This educational work gives employment to a few feresters who have special gifts for public work or who are needed for forest "extension" work among land owners. In addition, forest rangers are employed to specialize on fire patrol and prevention.

Finally come the forest schools whose business is to train and educate the foresters. Schools exist for the training of forest rangers and foremen of forest estates, which usually give a one-year course, mostly in the practical work of a ranger, such as that of fire supression tree planting, marking timber for cutting, surveying, and of other lines A still larger number of schools of forestry have been established. The recognized standard for adequate professional training is a 5 years college course based on the sciences of botany, physics, mathematics, and political economy.

The work of a forester may begin in the solitude of the wilderness with the survey topographic map and estimate of timber, but it comes back to contact with men. The purpose of forest management is to serve mankind, and in working out these problems of service not merely for next year but for decades to come, the forester acquires a breadth of vision and an insight into economic laws which make for the

building of character. His profession demands of him a rugged physique and ability to endure hardship, yet lifts him out of the monotonous drudgery of manual labour. No calling makes such varied demands on the individual, or so stimulates all-round development. The forester, in order to rise to the top of his profession, must be able by close observation to analyse the living forces of nature as expressed in the growth of trees and the survival of seedlings, and must control these forces to secure the ends desired. This requires scientific bent of mind and training. He must have an intelligent appreciation of engineering problems which are often the key to the use of forest resources, and must be alive to the economic needs of communities, that he may shape the Forest management to supply them. But he must also be a public leader, to secure co-operation in fire protection, create sentiment favourable to the establishment and continuance of forest policies, and secure beneficial legislation.

The foresters of America face a task which is only just begun. They have, however, shown themselves to be equal to their responsibilities, and to posses a knowledge of their common aims and ideals. Each member of this new profession strives to wrest from nature the control of her life-giving processes, and from man the recognition that foresight, conservation, and thrift must take the place of unrestrained exploitation of natural wealth in timber if our national prosperity is to continue.

Extract from "AMERICAN FORESTRY."
for May 1919.

Breaking rock by burning.

I do not claim any originality nor am I bringing over any new facts which are not known to one and all of Forest Officers. But what I am endeavouring to explain as briefly as possible is that breaking rock by burning is very practicable and effective besides its being simple and economical. Though every Forest Officer knows that rocks may be broken by burning and pouring water over it immediately after it is well burnt, yet, in my experience I have seen, few or none using this method as an effective means of removing rock in laying out roads in hilly localities. Different kinds of rocks such as Sand Stone, granite boulders, and also sheet rock, which often defy the wits of ordinary forest officers can be successfully removed. For the first burning the upper disintegrated portion peels off in flakes thus exposing the hard under surface; but on repeating the process it breaks off in lump and not only that, at every time the rock is burnt it develops a number of cracks, and by driving wedges into these and using crowbar, large quantities of rocks can be easily and repeatedly removed. So, what I am attempting to impress on the minds of my readers in, that burning method can be employed as an effective and main method in removing rocks to the best advantage. My critics may say that this method is not practicable where there is no water available near at hand; but it is not the case and it is my experience that the difference between results with and without pouring water is very little and almost a negligible quantity. With the crude method that is generally adopted a stone cutter with two other men to deliver hammer blows alternately on the jumper will not be able to have holes more than about 2 feet deep in all, through hard stones. And after such hard days of costly labour the concession of dynatic or magazine finds its way through the line of least resistance, the results will be discouraging and it is no wonder that a sigh of despair escapes one interested. But in the case of the burning method there is no such disappointment. The method is safe even in the hands of men with no experience, and it is not only simple and economical but also speedy and yields better results than blasting. The above information is based on the experience gained while laying out a road by the Vernacular Training School Students on Kambakam Hill platean during March 1919.

S. Chidambaram,

Junior Instructor,

V. T. S. Chingleput Dt.

Under—Planting in Nilambur.

My learned readers are aware that, preparatory to discussing proposals to under-plant teak, with suitable species to raise a layer of humus, of which, no doubt, there is a considerable absence, on the ground, Mr. Umapathi Mudaliar, in the course of an * article on the subject, makes certain statements, on which, he bases this absence of humus and deplores a consequent toxicity of the soil, under the teak plantations of Nilambur.

An Indian Forester though I am I should ask my readers to pardon me, when, in the following lines, I venture, in spite of an incompetence that I feel, to review, though with a view to just invite abler comments on Mr. Mudaliar's statements.

* Pages 50—54 Vol III No. 2.

Now, then, the first of these statements that Mr. Mudaliar make is "The Teak has not got much foliage" To this when he adds "I mean compared with shade bearing species" I should understand that, by the statement, he certainly means that the species of teak does not, as a rule, form so much foliage as a shade bearing species does.

On the other hand, what I observe in Nature is that, when compared to most, if not to all of its shade bearing associates, teak a great light demander, bears, when not suppressed or congested, a very heavy foliage on a much branching and spreading crown that it soon developes after topping over the less light loving species that teak is always found mixed with, in nature.

As protection of the soil against toxicity is, as he tells us, at the very commencement of his article, all his object in raising a layer of humus on the ground, he cannot, as I explain later in this note, be right, when, in his next statement, Mr. Mudaliar tells us that the little foliage that falls on the ground does not form good humus. Nor is he correct, when by the further statement, he would have us believe that what little humus is formed is either blown away by wind or burnt after the final felling. I doubt if, even on the provision of poor foliage to teak by Mr. Mudaliar, wind can effect the damage so wholesale. On the great mass of foliage that annually falls on the ground, by Nature's provision, all the worst April storms that we get in Nilambur, have not been found to effect the damage half so wholesale. What is burnt after the final felling can, according to his own theory, only be the foliage shed during the season preceeding the felling, and, no doubt, the effects of the final crop removed also. When physical protection of the soil by a cover of humus is not much, Mr. Mudaliar's point, what harm this destruction by burning of the leaves and the effects of the final crop can then do to the soil, is not apparent. By burning, we add to the soil potash, much

of which does not in the flat country that these plantations in general present, get washed away by rain, and should therefore, on the other hand, certainly be adding considerably to the fertility of the soil from the point of view of, perhaps, its toxicity. But, still, then burning after the final felling is the crowning point of Mr. Mudaliar's arguments in support of the very toxicity that he fears in the soil.

I pause here for a moment more to, now, consider yet another of his statements, which, in my opinion, is incorrect. To quote — the statement runs thus:— "Much of the nutrition goes to form wood cells in the stem and branches" and when made, as it is, though incidentally, incontinuation of the first statement that teak has not got much foliage, should certainly mean that, as a result of teak's not forming much foliage, much nutrition is saved and that this nutrition is used up in forming wood cells in the stem and branches. I really fear much to comment on this and should therefore ask my readers to just compare the statement with what any author on the subject has to say on the point of formation of wood cells and its direct * relation to the amount of foliage physiologically.

To pass on then to another article, on "underplanting in Nilambur" I should state that in the course of this, the writer Mr. C. Karunakara Menon quickly gets to discussing suitability of species to underplant teak with, while by way of assigning reasons for the great absence of humus he too I think (I have not got this article before me

[* We thank Mr. Chaikku for his pointing out this error in Mr. Umapathi's article. Certainly, a diminution of foliage in a tree, while it serves to lessen transpiration, entails a corresponding decrease in the assimilatory activity and hence of formation of plant tissues. In attempting to adapt themselves to their environment, plants make the necessary compromise—EDITOR.]

that in the plains of India by the beginning of the rains, the action of white ants hasten destruction as well as decomposition of fallen leaves trees, branches and debris of all kinds. No man can then, gainsay Mr. Rao on the point.

We see thus that by the action of the white ants first, and then of earth worms; not only do the leaves but also all other vegetable litter on the ground, get reduced to their primary constituents and added to the soil.

By the sudden disappearance of the humus, what we lose, is, therefore, the physical protection of the soil and not its chemical properties.

On the score of the absence of humus on the ground, therefore, Mr. Umapathi Mudaliar or any body else can have, absolutely, no reasonable fear of any toxicity in the soil.

Anxious attempts have, never-the-less, been made to mix teak with certain other species, and if given out with the full history of the experiments carried out in these attempts, their results would have no doubt, been interesting to know. This history is, still, what Mr. Mudaliar omits in his announcement of the results at the commencement of his article. The point for consideration here is, how ever, not this.

With what object in view the attempts at mixing teak with selected other species have been made is what we should now consider:-

We now know, that teak is not a light-foliaged species; *but a very heavy foliaged one.* The object in mixing can, therefore, have never, been to supply Mr. Mudaliar's ill-imagined deficiency of foliage on Teak.

We have seen that the great mass of foliage with all other vegetable debris, of which the ground under the teak, plantations of Nilambur, get a great good lot, from time to time, in the form of top-ends, and branches left by thinnings, gets well mixed into the soil in the form of these constituent elements. The object in mixing teak with other species cannot have, therefore, been to supply the unfounded, and indefinite, chemical deficiency of the soil, feared by Mr. Mudaliar. We have seen, too, that in these Tropical Forests, white ants render it impossible to have a constant layer of humus on the ground. It cannot be, then, with reasons, supposed that the object was to raise a constant layer of dead vegetable cover on the ground.

The object which those responsible for the attempts at mixing teak with these other species had in view, was, I think saner, surer and not very far to seek. While the white ants leave the ground bare of all dead vegetable litter, the pure crop of deciduous teak, leafless during the hottest months, expose the soil to the baking heat of the sun for a considerable period, every year. So far as I can understand, what they feared was, of course, the deterioration of the soil with regards to its physical properties, which are as emphasized by every writer on the subject, — of far greater importance in Indian Forestry, when we really care for the protection of our soil. They fear that by deterioration in its physical properties, the soil may not be able to bear the same intensity of growth on a second rotation as on the first. The idea that underlay the attempts at the mixture and the idea that lies under the proposed under-wood to teak in the Nilambur plantations, is all, I think, to raise a leaf cover, to afford protection to the soil. The idea is not new to us for we find reference made to it in that great guide of the Indian Forester viz "A concise manual of Sylviculture" much indebted to the author for which every Indian Forester shall ever remain.

With the above object in view in the proposed under planting I shall try to join Messrs. Mudaliar and Menon, on the discussion of suitability of species to plant under teak next.

10—8—1919. K. CHAIKKC,
Range Officer.

[We welcome, in particular, such articles of a critical nature, from the Ranger class—EDITOR.]

The Foot-ball season.

MADRAS FOREST COLLEGE, COIMBATORE.

———o———

The foot-ball season commenced from the month of February 1919 when the Six-a-side tournament began in the Sadivayal camp. The Semi-finals and the finals were played at head-quarters. In the finals, the play was very much contested and the team captained by C. L. Narayana Rao won the tournament.

During the month of March, when we were in head quarters, four matches were played, the first two being against the Agricultural College and the other two against the Stanes' High School. The first match against the Agricultural College was a draw and the next was a defeat for us. We won both the matches against the Stanes' High School.

During the month of May, we played two matches against the "Crescent Foot-ball Club, Coimbatore" which has the reputation of being one of the best teams in Coimbatore. Both the matches were "drawn" with the same score one goal each. The game was keen,

brisk and well contested. The College goal keeper, A. Rahimkhan, defended his goal very successfully

The following are the scores in foreign matches :—

4—3—1919.	*vs.*	Agricultural College ;	Draw 3 all
18—3—1919.	*vs.*	do.	Win 4 to 2
20—3—1919.	*vs.*	Stanes High School.	Win 2 to 0
27—3—1919.	*vs.*	do.	Win 3 to 1.

The year match between the Senior and Junior divisions of the College was played on the 24th of June, before the chief conservator and the Board of visitors. Owing to the strong wind, the game was concentrated in one wing alone. The game was equally offensive and diffensive on both sides, becoming more and more keenly consested as the time grew nearer and nearer to the long-blast of the controlling whistle. The match ended in a defeat for the Junior division to one goal.

The students awarded colours during this season are, Jurianze, Vajravelu, Narayanswami Iyer, Rahimkhan.

The old "Colours" were

A. Seshagiri Rao (CAPTAIN) and C. L. Narayana Rao.

A. SASHAGIRI RAO
Foot-ball Captain.
19—7—19.

Gymnastic Display

AT

THE MADRAS FOREST COLLEGE.

On the afternoon of the 28th June, the students of the College, gave a Gymnastic display in the presence of the Chief Conservator and Mrs. Cox, the Principal and Mrs Cowley-Brown, and the Board of visitors.

The programme opened with a group feat, and comprised a series of individual efforts, with two more groups interposed.

The opening group was an escalading feat in the form of a human tower: eight students formed the base, four the second storey, while B. S. Chengappa, and M. P. Subbiah undertook the sky-scraping. The execution of the group was very smart.

The other two groups were based on the parallel, and horizontal bars respectively, with Venkateswarulu doing the long-arm balance in the centre of each group. Both were very effective.

The individual feats were exceptionally good, the gymnasts being Venkateswarulu, M. P. Subbiah, Narayanasamy and Narayana Rao.

The "Star turns" were entrusted to Junior student Venkateswarulu, a finished gymnast, who performed some remarkably good stunts, particularly the "Plant" on the parallel bars, a feat requiring strength as well as skill, and the grand circle.

The setting of the groups was almost entirely the work of the students, and the execution was under the direction of the Junior Havildar.

The display lasted about fifteen minutes, andmost of the spectators wanted more, which is a sincere proof of appreciation.

If the new division furnishes a normal percentage of gymnasts, the display next year ought to be quite as good, if not better. It is hoped that the Havildar also will give a demonstration on the next occasion.— contributed —

Report on the judging of the Hostel gardens.

We publish below the criticisms of two of the judges of the Student's gardens:—

The Hostel gardens exhibited a wide range of quality; some were very poor indicating hardly any effort, eg: the garden plot between blocks 9 and 10, whilst others were distinctly good.

Block IV had the best garden undoubtedly. It was well laid out in accordance with a preconceived plan. The design was neat and though there was not much in it in the nature of flowers, there was evidence that a deal of care had been taken in its formation.

Block VIII had the next best garden. The designing had not been so carefully done as in the case of block IV, but, there was a good growth of flowering plants, Zinnias in particular.

Block V ran this very close. A portion of it was well laid out and a fairly good growth of flowering plants.

Block I was principally the effort of one student, who had a very ingenious form of fountain with suitable plants around it. The remainder of the plot did not exhibit much effort in gardening.

now) has but, the * wind and perhaps an easily breaking nature of the teak leaves also, to blame. This easily breaking nature of the leaves is not by the bye, natural to teak but acquired as any other leaves would acquire, by long exposure to the sun that these teak leaves are subject to on the ground, under the deciduous crop of teak in the plantations. The writer does not however explain clearly how this state of the leaves contribute to a reduction in the humus on the ground. If he thinks that by virtue of this easily breaking nature, the leaves disintegrate and get easily blown away by wind, I have but the same answer to this, as I have given against Mr. Mudaliar's theory of the wind.

Let not their arguments, however, be denied the benefit of the fact, that, in the pure crop of teak in these plantations the early density of the crop, its even age and the careful tending which the crop receives at the forester's hands, aiding teak's recognized propensities to complete its height growth, early development of full crown and foliage starts late in life and is also gradual and slow as it proceeds with the gradual openings by thinnings. The result is that, in the long run, the amount of foliage formed on the plantation teaks is poor, when compared to that on teaks in the natural forest.

To still strengthen their argument will it be, to mention, also, that defoliation by insects that invade these plantations for the purpose annually, causes a considerable reduction in the foliage on teak in the plantations.

But in spite of the much accused wind's influence on the leaves on the ground and inspite of also the two factors that contribute to a real reduction in the foliage on teak we, during the season of rest, when the deciduous teak has shed all its leaves and also when the worst April storms have come and gone, still find on the ground under these plantations—not to talk of the large effects (Top ends branches & c.) of the crop removed by thinnings—a thick mass of leaves, the sudden disappearance of which, by the beginning of the rains is what, in an articles on the subject should have first been explained.

I should, in this note on the subject, to now explain, this sudden disappearance of the great mass of leaves, state that by investigation in the direction indicated to us in the concise Manual of sylviculture, we find that when soaked by rain, the leaves, sooner than, when not soaked, are attacked and get reduced to apparently nought but the woody veins, which remain for some days under attack, by white ants, of which, we have in these tropical countries, teeming millions.

An acknowledged authority on Indian Forestry has, in the course of a book on the subject, observed that these white ants cover, instantly with earth, every leaf and other vegetable matter that get left on the ground, and carry them piece-meal into the earth, where, in course of time, other earth worms eat them with particles of earth and send up as "worm castings" in which form they get well mixed with the soil. The humus is, thus, not lost but only hidden.

And, Mr. Jogeswara Rao has, when, in the course of his "Forest Principles and Indian Forestry" — the editorial note at the foot of which, by the bye, could have been of immense benefit to the readers if those responsible for it, had in the note, given out points of difference — where and how they differ from or where they do not follow Mr. Rao in the expressions of his views — on pages 60 - 65 of Vol: 2 of this Magazine, he (Mr. B. V. Jogeswara Rao) writes to the effect that to have a constant layer of humus on the ground in these Tropical Forests is impossible, has the full support of, not only the authority just alluded to above, but also of, the concise manual of sylviculture, in that, it says

In future, I would suggest, that students should be advised to design their plots carefully, *i.e.* draw a plan of their idea of a garden and then, lay it out accordingly.

The gardens should be raised from seeds and plants supplied by the College. Obtaining of other species should be disallowed, as some students may have special facilities in this respect and would thereby have an unfair advantage over the others.

The idea of Hostel gardens is an excellent one. It must give the students pleasant occupation in their leisure moments, in addition to giving their quarters the homely appearance and tone desirable in a College.

8—7—1919. A. CROTHERS.

The Students' Gardens.

The Judging of the students' gardens took place on the evening of Sunday 29th June. The Judges were Mrs. Cox the wife of the Chief Conservator, Mrs. Crothers, and Mrs. Cowley-Brown. They took some time with their deliberations as they had no easy task. The students had been faced with many difficulties in the cultivation of their gardens: some due to the climate such as wind, lack of water and an inhospitable environment for flowers: others which came from the fact that they were in camp until about five weeks before the gardens were judged. There were many points to be considered. Some hostels had excelled in design and neatness, rather than in abundance of blossom; others again had merely outlined their irregular-shaped piece of ground with stones or borders, but had a wealth of strong grown flowers

within: one had been developed in one corner only where a well-designed miniature-garden with a fountain had been made. How to decide fairly among gardens of so many different merits was an arduous undertaking.

In the end the Judges decided that the garden of No. 4 Hostel, belonging to the Coorg Students was on the whole the best: it was of a very good design using up practically the whole of the ground allotted, it was well thought out, well kept and showed much care and attention: the flowers however were not by any means the best among the entries.

The 2nd prize was given to Block VIII, which had a perfect wealth of flowers, growing very strongly, and obviously well-cared for. As at first arranged there were only two Prizes, a 1st and 2nd, but the Judges added a 3rd and a consolation prize, as they felt that with only 2 they could not make a fair decision. Block V got the 3rd prize and Block 1 the special consolation prize for the small miniature garden. Next year it is hoped that there will be another garden competition: doubtless with their present experience the students will improve greatly on this year's work. At Coimbatore undoubtedly the thing to do is to give your attention to flowers and plants which really flourish and make a good show, rather than to drag up painfully things which do not like the climatic conditions. It is also to be remembered that borders and little hedges are a great feature here: in the case of the students flowering shrubs and such things as Cannas and ferns would be suitable as they would not need much attention while the College was in camp, except in the matter of watering.

S. C.-B.

A SUGGESTION.

Some time back, a proposal to erect a Reading Room was brought up before the Government which, not only gave its consent but also promised to contribute half the cost, the other half being contributed by sympathisers. I beg to suggest the following which, if unanimously accepted by my college mates would soon enable us to carry out the proposal.

Thanks to the Madras Government, the reorganization scheme of the Forest Executive Staff has been sanctioned and it is to be given effect to, I hear, from Ist October 1919, from which date all Rangers will get at least Rs. 30 more than their present pay. If those students, who had the fortune to have the Madras Forest College as their *Alma-Mater*, would only subscribe their increment, of the 1st month towards the erection of the room, I am sure we would be able to raise more than what would be contributed by the Government and thus to start the the building forthwith. It is, but a small token of our gratitude when we recall to our minds the kindness and consideration with which the Madras Forest College has shaped us to the present state and the zeal with which our welfare was watched whilst in the college.

I am sure most of my mates would agree to this and to those who do not, I would point out that, if, owing to want of funds, Government sanction the scheme only from 1st November instead of October they would have to lose it and that by payment of this increment out of their own free will, they would only raise themselves in the estimation of the rest.

Whether my suggestions are worth consideration or not, I leave it to the partriotism and good will of my mates towards their *Alma-Mater* and hope that my proposal would be gladly accepted.

Nilambur,
25th June 1919.

A SWAMIKUTTY,
Range Officer.

Students' Club Fund.

The following subscriptions have been received so for :—

		Rs.	AS.	P.
Imperial Service Officers		1220	0	0
Provincial Service Officers :—				
Mr. E. M. Crothers	...	50	0	0
Rai Sahib K.R. Venkataramana Ayyar		25	0	0
Md. Abdul Karim Sahib Bahadur		15	0	0
Mr. Mc Claughlin	...	20	0	0
Rangers :—				
Messrs. C. S. Ramanathan	...	4	0	0
M. Doraiswami Ayyar	...	9	0	0
A. Maniekka Mudaliar	...	10	0	0
P. A. Krishnaswami Mudaliar		5	0	0
S. Srinivasa Rao	...	10	0	0
K. A. Raghava Rao	...	15	0	0
A. P. Srainivasa Ayyangar	...	15	0	0
Kerala Varma	...	10	0	0
S. Ramachandra Ayyar	...	5	0	0

			Rs.	A.	P.
K. G. Monappa	...	*Western Circle.*	10	0	0
M. P. Subbayya	...	„	10	0	0
V. Narayanaswami Ayyar	...	„	10	0	0
M. Sankaran Nair	...	„	20	0	0
M. B. Subbayya	...	*Coorg.*	10	0	0
G. Sankara Pillai	...	*Ceylon.*	20	0	0
Abdul Rahiman	...	*Hyderabad State.*	35	0	0

Junior students:

G. Venkata Subba Rao	...	*N. Circle.*	10	0	0
K. Venkatesan	...	„	20	0	0
C. S. Ganapathi	...	„	20	0	0
K. Ramamoorthi	...	„	20	0	0
B. Krishna Rao	...	„	10	0	0
A. Seetharamiah	...	*C. Circle.*	10	0	0
M. Parameswara Ayyar	...	„	30	0	0
K. Raguraman	...	„	10	0	0
V. N. Subramania Ayyar	...	„	10	0	0
T. M. Krishnamachari	...	„	10	0	0
D. Krishnaswamy Ayyar	...	„	10	0	0
S. Nageswara Ayyar	...	*S. Circle.*	15	0	0
A. R. Manuel	...	„	15	0	0
M. P. Philip	...	„	20	0	0
T. Perumal	...	„	15	0	0
T. P. Palani Kumaran	...	„	20	0	0
S. Ramalingam	...	„	20	0	0
P. A. Madhavan	...	*W. Circle.*	20	0	0
K. Raghavan	...	„	20	0	0
P. Sankunni Nair	...	„	20	0	0
K. O. Anandan	...	„	25	0	0
R. Ramaswamy Gavandan	...	„	20	0	0
N. Venkataramana Ayyar	...	„	10	0	0
N. M. Karumbayya	...	*Coorg.*	10	0	0
C. S. Ganapathi	...	„	15	0	0
T. L. F. Perera	...	*Ceylon.*	15	0	0
B. S. F. Lebbai	...	„	10	0	0
C. K. Alujankar	...	*Bombay.*	10	0	0
V. Rama Rao Komolpur	...	„	10	0	0
Balakrishna Narayan Dev.	...	„	10	0	0
K. R. Marjani	...	„	30	0	0
C. K. Gulrajani	...	„	20	0	0
Nur Muhammad	...	*Hyderabad.*	5	0	0
		Total Rs...	2651	10	0

An aggregate of Rs. 796—6—0 has also been promised by old students, but has not yet been paid.

No reply has yet been received from 98 old students and others to whom notices of the project ha been sent.

Occasional Notes.

We offer our congratulations to the Hon. Mr. Cox, Chief conservator, and President of the Board of visitors, on his nomination to the Legislative council of the presidency.

During July, Messrs Crothers and Abdul karim, were deputed to undergo a 'refresher' course at the school of Field Engineering maintained by V. O. Sappers and Miners, Bangalore.

Mr. R. B. Cornwell rejoined the Staff on June 15th on his return from military duty in East Africa, Mesopotamia, and Persia, where he saw active service with the 61st and 94th Pioneers.

We offer our congratulations to Mr. E. M. Crothers (Instructor, Madras Forest College, on privilege leave) on his promotion *sub-pro-tem* to the Class of Extra Deputy Conservators

The attention of students is invited to "Popular Science Jottings" for July 29th, 1919 containing an illustrated article on Swimming. The number has been added to the Students' Library.

A copy of the Administration report on the Chenchus is placed in the Students' Library. The report is of exceptional interest and all students are advised to read it. We also commend to the notice of students "Notes on Forest Policy and Forest Management" by F. A. Lodge C. I. E.

Students' Flower gardens have now been laid out to the South of the Hostels—the old gardens to the North of the Hostels have been handed over to the students for the growing of vegetables.

Servants' gardens have been laid out to the south and east of the Servants' lines— with as a result a keen competition among servants to obtain permission to live in the lines.

Mr. S. Doraisamier has been promoted from the post of head clerk, to that of Manager (Rs. 60—2—80) of the Principal's Office.

T. M. Doraisami Pillai has been appointed Assistant Editor.

G. Appa Rao becomes a member of the House Committee under Principal's Standing Order VII (2).

On the recommendation of the Vice-President, C: S. Ganapathi (Coorg) is awarded his colours for Hockey and is appointed Vice-Captain.

K. Appayya is Captain of Hockey, L. Juriañz of foot ball, V. Krishna Rao of Cricket, and M. P. Subbayya of Tennis.

The other "colours" in residence are M. B. Subbayya (Hockey), V. Narayanasami Ayyar (foot-ball) Abdul Rahim Khan (foot-ball) J. A. Muliyil (athletics).

M. R. Ry. Srinivasagam Pillai (1915—17) has presented the College with one peacock. The principal would be very glad to receive more of these or other birds.

The receipt of 16 partridges from V. Ranga Rao, Dy. Ranger, Satyamangalam, and one dozen partridges from Mr. A. B. Fenn (1916-18 Dn.) are acknowledged with thanks.

We regret to announce the death from Influenza of Junior Student D. C. P. Wijeyaratne on the 19th August at the Government Hospital, Coimbatore. The Student became ill on the 8th August; he was under the treatment of the College Medical Officer until the 14th idem when he was removed to the Government Hospital. Up to the 16th inst. he was doing well, but subsequently his illness assumed a grave turn and owing to complications that ensued he was unable to rally.

The sympathies of the College are offered to his bereaved relatives.

We regret to have to announce the death from Influenza in Tinnevelly on 31st July of Mr. V. Subrahmanya Ayyar M. A., F. L. S., Extra. Dy. Conservator of Forests.

Mr. Subrahmanya Ayyar had a distinguished career in the Dept. For some years he was Zoologist at the Forest Research Institute at Dehra Dun., where he had previously graduated with Honours. He subsequently joined the original staff of the Madras Forest College, and

only quitted his instructorship to take up the important post of Conservator in Travancore State.

We offer our sympathetic condolences to his bereaved widow and family.

Miscellanea.

Extract from the speech of the Inspector General of forests at the Distribution of prizes on 26th March 1919, at Dehra Dun.

"The Government of India have recently decided to place no limit to the recruitment of the Provincial Seavice from the Ranger staff, but to leave the proportion of the vacancies to be filled by such promtion to the discretion of local Governments.

Again the Reforms Scheme will almost certainly result in reserving some proportion of the vacancies in the Imperial branch of the service. It is possible, therefore that in the years to come some of you will be in positions of great responsibility carrying considerably higher salaries than you had any hope of obtaining when you commenced your training. I want to try and impress on you that the chance of your reaching these positions depends entirely on your own efforts. Promotion from the Ranger staff to the Provincial Service, and from the latter to the Imperial branch, will not go by seniority, but by selection and your selection for any of the higher appaintments open to you will depend far more on your proving your worth by the work you do in the forest charges of your provinces than on the position you now hold in your class lists."

1696000,000 c.f. of timber have been felled in France duing the war. In addition Military operations have destroyed 254,400,000 c.f. while the Germans confiscated 296,800,000 c.f. It will take France over 100 years to fully recover from these forest losses, as the productive capacity of the forests has been reduced by 42,400,000 c.f. per annum over a very long period.

8% of the whole area of Reserved Forests, unclassed state Forests and Protected Forests in India and Burma is situated in the Madras Presidency, where 16% of the cadre of the Imperial Forest Service is employed. Madras is responsible for 12½% of the total forest revenue. 15% of the expenditure and 9% of the surplus; 10% of the outturn of timber and fuel; 15% of the cattle grazed; 35% of the area under regular plantations and 30% of the offences reported. 21% of the total expenditure on communications and buildings is incurred in Madras.

Since 1892 the surplus of revenue over expenditure in Madras has increased 700%.

R. D. R.

The Government Entomologist writes:— "The scale insect attacking the trees on the Forest College Estate is one which is very common on Babul and sometimes capable of doing a lot of damage.

It is preyed upon by the caterpillar of a noctuid moth "Eublemma" sp.

The name of the scale is Anomalococcus indicus, Green, a recently described species.

Apart from this nothing is known of its life history."

Sub-family Asterolecaninæ. Anomalococcus Indicus sp. new. Green.

This is a serious specific pest of Acacia arabica (Babul) in the Coimbatore District The female scales are pale white in colour and spherical in shape. Young trees suffer badly from this pest and badly infested trees show the white scales in numbers on every portion of its stem, branches and shoots. A moth '*Eublemma Scitula*' is found predacious on the scale and among the scales on the branches can be found the cocoons of this caterpillar which appear as dark brown spherical shell-like objects bigger than the scales. Large colonies of the black ant *Camponotus Compressus* are found nesting at the foot of the trees and visiting the infested branches frequently. The insect is a species new to Science.

T. V. Ramakrishna Ayyar,
Ag. Government Entomologist.
Agricultural College,
Coimbatore.

(Extract from the Journal of the Bombay Natural History Society. Volume XXVI, No. 2.)

The Electro-magnet.

One truckful of swarf can be emptied in 7 minutes by a crane and electro-magnet with one man in charge; the time formerly employed for this was 5 hours, four men being required. Therefore one man,

		Rs.	As.	P.
M. N. Raman Pillai	...	10	0	0
A. Sawmi Kutti	...	15	0	0
S. Chinna Dorai	...	20	0	0
C. M. Kunhirama Nair	...	10	0	0
Korah Fenn	...	10	0	0
S. M. Srinivasagam Pillai	...	10	0	0
Gulam Dastagir	...	6	0	0
D. E. Lewin	...	6	0	0
S. A. Dawson	...	4	0	0
K. Thiruvenkatachari	....	2	0	0
C. Karunakara Menon	...	6	0	0
N. T. Thambi	...	6	0	0
P. Karunakara Menon	...	6	0	0
K. V. Krishnaswami Ayyangar		15	0	0
K. Venkataramanan	...	10	0	0
T. Paramasivam Pillai	...	3	0	0
P. Dananjaya Rao	...	2	0	0
Kesava Pillai	...	3	0	3
J. Ramalingam	...	2	0	0
Rama Rao Kini	...	2	0	0
L. A. Krishna Ayyar	...	3	0	0
P. M. Mathew	...	5	0	0
A. K. Kandan	...	5	0	0
L. J. Taylor	...	7	0	0
K. S. Raghavachari	...	7	0	0
L. R. Narayana Ayyar	...	20	0	0
Kunhiroyan	...	7	8	0
S. Chidambara Ayyar	...	5	0	0
B. S. Ramaswami Ayyar	...	5	0	0
B. Sambamoorthy	...	10	0	0
C. H. Ashe	...	20	0	0
C. S. Nanjappa	...	10	0	0
C. S. Srinivasa Rao	...	40	0	0
Mr. P. Krishnan	...	5	0	0
Interest due	...	6	0	0

Senior students:

			Rs.	A.	P.
G. Appa Rao	...	*Northern Circle.*	20	0	0
P. V. Krishna Rao Naidu	...	„	20	0	0
A. Rama Rao	...	„	20	0	0
T. Sriramulu Naidu	...	„	20	0	0
P. Chengal Reddi	...	*Central Circle.*	10	0	0
T. M. Doraiswami Pillai	...	„	20	0	0
J. A. Muliyil	...	„	20	0	0
D. N. Subramania Ayyar	...	„	10	0	0
D. Venkateswarulu	...	„	20	0	0
K. P. Chathu Nair	...	*Southern Circle.*	20	0	0
N. S. Eswaran	...	„	10	0	0
J. D. Theodore	...	„	20	0	0
S. Nagalingam Pillai	....	„	25	0	0
A. N. Ponniah	...	„	10	0	0
K. Thangavelu Pillai	...	„	20	0	0
K. R. Subramaniam	...	„	20	0	0
K. Appayya	...	*Western Circle.*	10	0	0
S. V. Doraiswami	...	„	10	0	0
P. Kannan	...	„	20	0	0

A comparison of the Gazetted Officers lists of July 1882, July 1892, and April 1919 affords several interesting items of information.

In 1882 the Department consisted of 1 Conservator on Rs. 1,000 (Headquarters Ootacamund) 15 Deputy Conservators (All Europeans) on Rs. 250.—700. no Assistant Conservators, but 7 Sub-Assistant-Conservators on Rs. 150—200.

The total strength of Rangers was 33. Ten years later there were 3 Conservators on Rs. 1,100, — Rs. 1,350, Rs. 1,600, 24 Deputy Conservators (including 5 posts vacant) on Rs. 550—900, and 10 Assistant Conservators (including one vacancy): all the above Officers were Europeans including 2 vacancies there were 11 Extra Assistant Conservators on Rs. 200—350. and 3 Sub-Assistant-Conservators on Rs. 150.

In April of this year the strength of the Department was as follows:—

4 Conservators on Rs. 1,500 – Rs. 1900, 28 Deputy and Assistant Conservators (2 vacancies) on Rs. 380 — Rs. 1,250; 4 Special Forest Officers.

1 Forest Engineer, 8 Extra Deputy Conservators on Rs 650. to Rs. 800 and 34 Extra Assistant Conservators (One vacancy) on Rs. 250. to Rs. 550 also 3 Extra Assistant Conservators probationers: and one special Veterinary Inspector.

A very large increase in the grades of Assistant Conservators, Extra Assistant Conservators, and Rangers has recently been sanctioned.

By the time Officers to fill the vacancies have been trained, the service as represented in Madras will be adequately equipped in point of numbers and salary, and under the Chief Conservator it may be anticipated in these circumstances that the professional, financial. and administrative progress will be at a rate undreamed of 25 years ago.

Means to discover watering of milk

By means of two simple tests an authority asserts that it is possible to determine with a reasonable degree of accuracy the quality of milk. A qualitative test to show whether the milk contains water or not is made in the following manner. Take a perfectly clean steel hatpin and immerse it point down into the milk. If on withdrawing it a film of milk covers the same, there is no free water present. On the other hand the presence of water in small quantities will prevent the milk adhering to the pin.

The "Scientific American" states that a cube of gold with each dimension 43.8 feet would represent the estimated total of the World's supply.

The World's National Debts. amount to many times this. quantity.

From, "American Forestry" April 1919 :—

Rs. 1920,000,000 is the general estimate of the war losses and loss in reproduction value of the destroyed forests of France. Some

aided by the machine, can do in 7 minues what it would formerly have taken him 20 hours to do by hand.

According to Mr. H. A. Mears the gross economy of a crane and magnet as compared with the crane alone is as follows:— When loading locomotive tyres, work which a crane alone performs in 5 hours can, with the addition of the electro-magnet, be performed in 4 hours; when loading heavy castings, the crane with the electro-magnet performs in 3 hours work which the crane alone takes 20 hours to do.

At the beginning of April a small parcel of 1″ teak boards was sold in London at £ 95 per ton; equivalent, at the then rate of exchange, to Rs. 1253 per ton, or Rs. 25 per c.f.

Orchards made with high explosives.

The vigorous growth of wild plants about shell-holes is attributed partly to the fissuring of the soil by the shell-fire and partly to the nitrogenous substances introduced. In a proposal to the French Academy it has been suggested that an ideal orchard soil could be produced by breaking up the rough surface with dynamite in such a way that fertilising material would be driven into the soil.

(Popular Science Sifting.)

May 13th 1919.

Homing pigeons for Forest Fire protection.

The State of Minnesota and the Canadian Government have adopted the system of Homing Pigeon Communication devised by Philip E. Edelman, E. E. for Forest Fire protection. This system provides reliable communication under conditions impossible to wire and wireless methods in wild countries. In a given area, a home nest is established at head quarters. The men in going on patrol carry two birds in a special carrier on their back, or kit, or in their canoe. If emergency arises they can instantly call for help by releasing one bird with message, and 10 minutes later, the second bird with check message to insure delivery. The weight to be carried is thus less than any electrical or radio apparatus. The birds fly directly to headquarters to which they have been trained, at about 50 miles per hour, whereas in impassable areas, a man runner might take two days for the same distance. The birds are well suited to the work and temperatures existing in large forest areas in winter as well as summer and are 98 per cent reliable.

(Scientific American)

May 3rd 1919.

Dynamite to grow fruit.

A French Horticultural authority has laid before the Academy a paper making claim that dynamite is an important factor in aiding the fertility of orchard soils, "due partly to the fissurisation of the soil and partly to the impregnation of the soil with nitrogenous subjects." He

makes mention of the fact that the dynamite is to be used "in conjunction with a suitable amount of fertiliser in a container surrounding the explosive in such a way that the force of explosion would drive the former into the fissures produced by the explosion." The very fact that Dynamite contains two of the most important and active fertilising agents, to wit, nitrate and sulphur, makes it unnecessary, Mr. J. H. Willman has stated in the 'Scientific American,' to go any further in aiding the fertilisation by blasting, than to just use the dynamite alone.

(Popular Science Siftings.)

June 10th 1919.

Plants and Coloured Lights.

Green seems Fatal.

To test the effect of light of different colours upon plants, Dr. Miramond de Laroquette has built at Algiers hot houses of blue, green, yellow, red and white glass, and in these he grew many kinds of plants from tiny moulds and mosses to lentils and laurels. In all the coloured lights, he states in a recent paper, the plants grow more fragile than in the white light, with long thin stems and pale colour. Yellow light affects them least, blue and red about equally, but with differences according to the plants, and green always kills them after a short time.

Under blue light the growth is at first scarcely more rapid than under the white; then the stalks and petioles suddenly lengthen abnormally.

Under the green, on the contrary, the growth is at first more rapid than under the white, but soon ceases and the plant fades and dies.

Under the yellow and red the growth is excessive, and continues so. The plant seems more luxuriant, but the exaggerated length of the stems and petioles is counter-balanced by their slenderness. The total weight is less than normal under the red, but slightly greater under the yellow. The size and thickness of the leaves is less under all colours, but especially under green.

The development of the roots corresponds exactly to the degree of vitality of the plant.

Plants flower and seed under blue, yellow and red light, but always tardily and less abundantly than in white light. In green lights plants do not flower and consequently produce no seed. No modification is noticed in the colour of the flowers.

Wheat grown in the white hothouses had full grains containing much starch. That in the yellow had only half as numerous and half as large. In the blue and red there were only a few grains and these had scarcely any starch.

Plants that under white light had short, thick, stiff stalks growing straight upward, had under coloured light, especially under blue and red, long, thin soft stalks that fell over and dragged on the ground unless supported by trellises.

(Popular Science Siftings)

July 8th 1919.

List of books presented to the Library by C. B. Dawson Esq. I. F. S.

1. Text book of the Disease of Trees.
2. Timber and how to know them.
3. Forestry in Southern India, by Morgan.
4. Director's report and Statement of Account for 31 of East Land Extension Gold mining.
5. Forest Law by Beaden Powell.
6. Lectures on Physiology of plants, by Julius Von Sachs.
7. Schlich's Manual Vol. 1 to 4. ... 4 copies.
8. Elementary Lessons in Physical Geography.
9. Biology of Armillaria Mucida.
10. Rabis and Ant-Rabic treatment in India.
11. Spineless cactus. ... ... 6 copies.

A pamphlet on spineless cactus has been added to the Library.

If the claims made by the publisher (The Garden Superintendent Theosophical Society adyar, Madras.) as to the nutritive value and ease of propagation can be made good in practice, the cultivation of this species should go a long way towards solving the problem of cattle fodder, and incidentally therefore of Forest protection.

Examples of unidiomatic and ungrammatical English taken from official correspondence.

Wrong.	*Right.*
1. Petitioner *will be enquired.* ...	*Enquiries will be made of* petitioner or Petitioner *will be questioned.*

Wrong.	*Right.*
2. I will *avail* of the leave. ...	I will *avail myself* of the leave.
3. He *stole away* two cows. ...	He *stole* two cows.
4. It *is not also* true. ...	*Neither is* it true.
5. I will *dispose it off.* ...	I will *dispose of it.*
6. He *robbed off* the property *of P. W. I.*...	He *robbed P.W.I. of* his property.
7. They *enjoyed* the land for 2 years.	*'Occupied' 'Cultivated' or 'possessed'*
8. The cost was *annas four.* ...	The cost was *four annas.*
9. They *gave out* information	*gave or furnished.*
10. The party *comprises of* four men ...	*is composed of* ... or *comprises.*
11. He was absent *in* his house.	*from* ...
12. In order to prevent him *to do*..	*from doing.*
13. They *necked him* out. ...	They *pushed him* out.
14. It is *no wonder to see.* ...	It is *not to be wondered at* that
15. They beat *with hands* and his turban *fell to ground.*	... with *their* hands ... fell to *the* ground.
16. *From* a very long time. ...	*For* a very long time, or *from* a very distant date.
17. He *gives out* his name as ...	*Says* that his name is.
18. They took to heels. ...	Took to *their* heels.
19. A has been substituted *by* B...	B has been substituted for A. A has been replaced by B.
20. It *costed* two rupees. ...	It *cost* two rupees.
21. He *was put up* in the choultry	'lived' or 'lodged' or 'stayed.'
22. He *has no other go* but to say	He *is compelled* to say. He *cannot help* saying.
23. He was *fisted* by accused. ...	'was *struck* by' or 'accused struck him'
24. He *sided* Ramayya. ...	He *took* Ramayya's *side.*

Wrong.	*Right.*
25. He *tore off* the petition.	
He *tore away* the petition.	... He *tore up* the petition.
26. It was done *by me only.*	... It *was I who did it.*
27. *Rupees five.*	.. *Five rupees.*
28. *Enough of water*	... *Enough water.*
29. He is charged *for* having stolen	... charged *with* having.
30. Promises *to stick up* to	... ... to stick to ...
the work.	or better ... attend to ...
31. There is *no objection* ...	... *no objection to* ...
for his being appointed.	
32. Gave gold jewels *of* two tolas...	... weighing two tolas.
33. Accused was *smelling* arrack...	... *smelling of*
The rifle *smells* powder ...	... *smells of*
34. He had *full of* work. ...	... *much* work ...
35. Rs. 5 *was reduced* from the ...	... *was deducted* from
demand.	or 'the demand was reduced by'...
36. He *requests for* an interview ...	*requests* an interview.
37. He *bears good character.*	... His *character (or reputation) is good.*

List of Books received for the General Library for the Quarter ending 30th June 1919.

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1. The Kiln-drying of Lumber by E. H. D. Tiemann.
2. The Graphic Souvenir of the German Navy's surrounder.
3. Indian Forest Records Vol. vii. part 1. Preliminary note on the seasoning of some Indian timbers by natural methods, R. S. Pearson I. F. S.

4. Report on Public Instruction in the Madras Presidency for 1917—18. Volumes 1 and 2.
5. Report and working scheme of the Nilambur teak plantations.
6. Indian Industrial Commission. Minutes of Evidence 16—18. Vol. VI. 1918.
7. Economic studies Vol. I. Some South Indian villages.
8. Madras Timbers 1919 by A. W. Lushington C. I. E.
9. Indian Forester Volumes 2 and 3 (one bound book.)
10. Working plan for the Ghat forests of Coorg.
11. Note on a tour of inspection in the Coorg forests by G. S. Hart C. I. E. 1919.
12. Forestry and Lumbering in the United States of America.
13. Administration report of the Andamans. 1917—18.
14. The Indian Evidence Act by Ratanlal Ranchhoddas B. A.
15. Indian Penal Code. 8th edition by Ratanlal Dhiraglal.
16. Outline of Medical Jurisprudence for India.
17. Code of Criminal Proceedure.
18. Chitaker's Peerage, Baronage, Knightage and Compapionage.
19. International review of the Science and practice of Agriculture,
20. Logging by Ralph Clement Bryant.
21. Report of the Council and Auditors of the Zoological Society of London.
22. Proceedings of the Agri-Horticultural Society of Madras. (October to December 18).
23. Burma Forest School Director's Standing Orders. Parts 1 and 2.
24. Madras Medical Register for 1918.
25. Guide book for investors in Government Security.
26. Summary of the report by F. A. Leete Conservator of Forests on his visit to Canada, the United States and England.

Contributions to the Gass Museum.

Serial No.	Contribution.	Contributor.
1	Seeds of Garcinia indica, and sample of butter manufactured therefrom.	M. R. Ry. C. Karunakara Menon, Range Officer, Sankaranarayana range.
2	Five bark samples.	M. R. Ry. J. Sadasiva Ayyar Avl. B. A., District Forest Officer, N. Mangalore.
3	Crude lac from: (a) Butea superba. (b) Schleichera trijuga.	Mr. C. S. King, R. O. Mujjagoda Range.
4	A long panel of Wrightia tinctoria.	Mr. A. B. Fenn, Range Officer, Talamalai.
5	Six bark samples.	Do.
6	A Pterocarpus Marsupium seed with *two* radicles emerging out of it.	Mr. R. B. Salisbury, Range Officer, Instructor V. T. S. Southern Circle.
7	Fourteen sample barks.	M. R. Ry. A. R. Narasimha Ayyangar Avl. D. F. O. N. Mangalore.
8	Seven sample barks.	M. R. Ry. A. Rama Hebber, R. O. Bandar Range.
9	Three pieces of Red Sanders bark.	M. R. Ry. S. Ramachandra Ayyar, R. O. Cuddapah.

Serial No.	Contribution.	Contributor.
10	About two hundred botanical specimens.	Sayyid Abdul Qadir Sahib Bahadur E. A. C.
11	Photograph of winners of Marathon race 1919.	Do.
12	One live dung-beetle.	Mr. R. B. Salisbury Instructor V. T. S. Southern Circle.
13	Two short panels of Red Sanders.	M. R. Ry. S. Chinnadorai Pillai, R. O. Balapalle.
14	(a) Two spoons made of Carissa carandas. (b) Two spoons do. Wrightia tinctoria.	Do. Do.
15	One long, and one short panel of:- (a) Vitex altissima. (b) Veteria indica.	Range Officer Kasargode Range.
16	Two short panels.	M. R. Ry. L. Govindakrishnier' R. O. Mamurghat.
17	Eight bark samples.	M. R. Ry. E. K. Krishnan Avl. D. F. O. N. Vellore.
18	One Bison head.	Mr. L. J. Taylor, R. O. Santavasal.
19	Twelve bark samples.	M. R. Ry. C. Vasu, R. O. Begur. Range.

Serial No.	Contribution.	Contributor.
20	Sixteen bark samples	M. R. Ry. Ramasamier R. O. Bargur Range.
21	Two " "	M. R. Ry. Y. P. Lakshmayya, R. O. Nandyal.
22	Root of Withanea somnifera.	M. R. Ry. K. Ramasamier, Overseer, M. F. C.
23	One short panel of Red Sanders.	M. R. Ry. M. R. Sundaram Ayyar Avl. D. F. O. N. Cuddapah.
24	Five bark samples.	Mr. V. T. Staggs, R. O. Bezwada Range.

Advertisement.

The following numbers of the 'Indian Forester' are required for the *Students'* Library, The Principal will be glad to receive any that officers can spare:—

1. Volume 1, 2 and 3 for 1875—76, 1876—77, and 1877—78.
2. Volume 6 for 1880—81.
3. Volume 13 for 1887—February Number.
4. Volume 14 for 1888—January, February, March, April and December numbers.
5. Volume 15, 16, for 1889, and 1890.
6. Volume 17 for 1891—August, September, October and November numbers.

7. Volume 18 for 1892.
8. Volume 19 for 1893—February number.
9. Volume 20 for 1894—January, February, March, July and August numbers.
10. Volume 21 for 1895.
11. Volume 24 for 1898—March and April numbers.
12. Volume 25 for 1899—April, May, June and August to December numbers.
13. Volume 26 for 1900—August number.
14. Volume 34 for the year 1908—July number.
15. Volume 36 for the year 1910—August number.
16. Volume 38 for the year 1912—January, March, October and December Nos.
17. Volume 39 for the year 1913—January, April, September and October Nos.
18. Volume 40 for the year 1914—June numbers.
19. Volume 41 for the year 1915—April and September numbers
20. Volume 42 for the year 1916—May, June, November and December numbers.
21. Volume 43 for the year 1917—January, February, April, November and December numbers.

WANTED.

A copy in good condition of "Hume and Marshall's Ducks" with coloured plates intact. Apply stating price to the:—

PRINCIPAL, MADRAS FOREST COLLEGE,
Coimbatore, Lawley Road, P. O.

WANTED.

For the Library a copy (mounted if possible) of the June 1916 College Group.

Rs. 2—4—0 will be paid for it.

Madras Forest College,
Coimbatore.

F. L. C. Cowley Brown,
Principal.

Gazette Notifications.

6th May 1919.

Mr. C. D. McCarthy, Conservator of Forests, granted combined privilege leave and furlough for two years with effect from date of relief.

Mr. Stephen Cox, Conservator of forests, Northern Circle, to be Chief Conservator of Forests from 1st June 1919.

Mr. Charles Mahony, E. A. C. of Forests, on probation transferred from West Cuddapah Dt. to work under the orders of D F. O., South Cuddapah Dt., with reference to revision of Red Sanders working plan.

M. R. Ry. K. G. Sundara Raja Rao Ag. *Sub-Protem* Ranger VI grade posted to the charge of Nellore Range will join and work under the R. O. Nellore until he takes over charge.

Mir Abdul Hussain Kirmani Sahib B. A, reinstated as R. O IV grade is posted to Anantapur Dt. on special duty-to work under the orders of D. F. O. till he takes charge of Tadpatri Range.

The resignation by M. R. Ry. R. Krishnaswami Ayyar Pro. R. O. is accepted from date of relief.

M. R. Ry. N. C. Mahadevan Pillai R. O. IV grade granted sick leave on half pay on medical certificate for 4 months from 7—4—19 and posted to the charge of Bukkapatnam Range, Ananthapur Dt. on return from leave.

M. R. Ry. T. Paramasivam Pillai R. O. VI grade granted privilege leave for 5 weeks from 25—5—1919 and is posted on return from leave to the charge of Rajampet Range.

Mr. I John Pro. R. O. VI grade posted to charge of Chitvel Range.

13th May 1919.

Mr. T. Clear Dy. Conservator of Forests combined privilege leave and furlough for one year from or after 1—7—19.

M. R. Ry. T. V. Venkateswara Ayyar Avergal Pro. E. A. C. granted privilege leave for one month and four days.

The following postings of students returning from the M. F. College and transfers are ordered subject to their obtaining certificates.

1. T. G. Sitarama Mudali to the charge of Ganganapalli Range, West Cuddapah Dt.
2. C. N. Narasimha Achari to the charge of Vanpalli Range, West Cuddapah Dt.
3. N. C. Mahadevan to Guntur Dt. to work under the orders of D. F. O. in connexion with the preparation of Working Plan in Venikonda Range.
4. K. Purushothama Rao to the charge of Bellary Range Bellary Dt.
5. M. R. Ry. V. Jagannatham Pillai Ag. R. O. VI grade transferred to South Cuddapah Dt. to work under the orders of D. F. O.
6. P. K. Kuttappan Pillai is reverted to *Sub-protem* Dy. Ranger I grade and transferred to South Cuddapah.

M. Rama Rao Kini, Ranger VI grade on closing of V. T. School is transfered to central Coimbatore Division to take charge of Erode Range.

17TH JUNE 1919.

Mr. C. B. Dawson Dy. Conservator of Forests, combined privilege leave and furlough for 2 years from or after the 1st August 1919.

Mr. H. F. A. Wood, Conservator of Forests, Central Circle, combined privilege leave and furlough for one year and 2 months from date of relief.

Mr. F. R. Madan, D. F. O., Nellore, privilege leave for two months.

Mr. A. B. Jackson, Ag. Conservator of Forests in charge of the Southern Circle, on relief by Mr. H. A. Latham, to be in charge of the Central Circle, during the absence of Mr H. F. A. Wood on leave or until further orders.

24TH JUNE 1919.

Mr. W. A. Woodhouse Adolphus, E. A. C, on return from leave to be D. F. O., Kollegal.

Mr. H. W. A. Goudoin, E. A. C., on return from Military duty to be D. F. O. South Kurnool, until the return of Mr. G. W. Thompson from leave.

Mr. J. H. Longrigg, D. F. O., the Nilgiris, to be Instructor, Forest College, Coimbatore, vice Mr, C. B. Dawson granted leave or until further orders. Mr. Longrigg will be on special duty from the date of relief from his present appointment until the date on which Mr. Dawson goes on leave.

Mr. B. F. Rigold, Dy. Conservator of Forests, on return from leave, to be D. F. O., the Nilgiris.

M. R. Ry. K. A. Chengappa Avergal, E. A. C. on return from leave to be D. F. O., West Vellore, and Dy. Collector in the North Arcot District.

M. R. Ry. V. N. Seshagiri Rao Averal, E.A.C., Nellore, to act as D. F. O Nellore, during the absence of Mr F. R. Madan on leave or until further orders.

Mr. A. M. C. Littlewood, *Sub-protem* E. D. C., to be permanent E D. C. with effect from the 1st April 1919.

M. R. Ry. Rao Sahib, K. R. Venkataramana Ayyar Avergal, D. F. O., South Vellore, to be in charge of the West Vellore divislon, and to be Dy. Collector in the North Arcot Dt. in addition to his own duties from the 23rd April 1919 until relief by M. R. Ry. K. A. Chengappa Avergal or until further orders (This cancells notification in the Fort St. George Gazette dated 25—3—1919).

M. R. Ry. K. Jayaraman, *Sub-protem* R. O. VI Grade, will be considered, to have been on privilege leave from 23—4—1919 to 3—5—1919 (inclusive) with permission to prefix the Easter holidays from 13th to 22nd April 1919. M. R. Ry. K. Parthasarathy Ayyangar, Ag. R. O. VI Grade. is transferred from South Vellore to West Vellore division for charge of Alangayam Range.

1ST JULY 1919.

1. Mr. I. John, Pro. Ranger VI Grade, or relief by M. R. Ry. I. Paramaswami Pillai, R. O. is posted to the Charge of Bellary range.

2. K. Purushothama Rao on return from M. F. College, transferred to the charge of Chitvel range.

3. V. S. Rangaswami Nayaker, Ag, Ranger VI Grade in charge of Chitvel Range, will continue to hold charge until relieved by No. 2. M. R. Ry. S. G. Venkataramanan (M. R. H.) Pro. Ranger VI Grade, is confirmed in that appoinment.

8TH JULY 1919.

The services of Mr. C. J, P. Van Halften, Pro E. A. C. are placed at the disposal of the Superintendent of Post Blair, with effect from the afternoon of the 30th May 1919.

M. R. Ry. T. N. Seshagiri Rao, on leave, is permitted to return to duty before the expiry of his leave and to hold charge of Nellore Range.

The unexpired portion of the leave is cancelled.

M. R. Ry. K. G. Sundara Raja Rao, Ag. Ranger VI Grade is transferred to Chittoor Dt. to work under the orders of the D. F. O.

M. R. Ry. C. Rajagopal Nayudu, R. O. II grade is granted combined privilege leave and furlough for two years.

Mr. W. G. Dyson, Assistant conservator on probation, North Coimbatore division, is transfered to South Coimbatore division to do duty under the D. F. O.

15TH JULY 1919.

M. R. Ry. V. Narayana Ayyar Avergal, *Sub protem* E. A. C., is granted privilege leave for 2 months.

Muhammed Habib-ul-lah Sahib Bahadur, E. A. C., to be D. F. O., North Coimbatore, with effect from the date on which he took charge of the division from Mr. Wimbush and until further orders.

(1) M. R. Ry. S. Ramachandra Ayyar R. O. IV grade is granted privilege leave for one month.

(2) M. R. Ry S. Sankara Alwa, Pro. temporary ranger is posted to the charge of Cuddapah range in addition to his own, vice No. 1 on leave.

Mr. H. Mac Bhide Ranger V grade is granted privilege leave for three months.

The posting of C. N. Narasimha Achari to the charge of Vempalle Range, is cancelled.

M. R. Ry. M. Subroil Nayudu, R. O. III grade on return from leave is posted to the charge of Vempalle range.

M. R. Ry. A. Ranganayakalu Naidu, R. O. III grade, is on the close of the V. T. School, posted to the charge of Chitvel range.

M. R. Ry. S. Chidambara Ayyar, Ranger IV grade, *Sub-protem* is on the close of the V. T. School, transfered to South Cuddapha Dt. to work under the

orders of D. F. O. to supervise the standard marking in the improvement felling series.

Md. Asad-ul-lah Ghatala Sahib, on expiry of leave, to Morricheruvu range.

M. R. Ry. T. Srinivasa Achari on Expiry of leave to Markapur range, Kurnool West Dt.

M. R. Ry. S. M. Srinivasagam Pillai, R. O., VI grade is posted to the charge of Pappiredipatti range.

Mr. R. B. Salisbury, R. O. III grade, is posted to North Salem Dt. for special duty relating to sandalwood work.

22nd JULY 1919.

K. Purushothama Rao, is, on relief posted to Anantapur Dt., to the charge of Madakasira Range.

M R. Ry. D. C. Bhide is, transferred to charge of Kalyandrug Range.

M. R. Ry. B. V. Vydeeswara Ayyar is, on relief, posted to Nellore, Dt. to work under the orders of D. F. O. Nellore.

M. R. Ry. A. Ranganayakulu Naidu, R. O., is posted to the charge of Rajampet Range.

M. R. Ry. T. M. Paramasivam Pillai, R. O., is transferred to the charge of Chitvel Range.

M. R. Ry. T. Subbrayulu Nayudu, R. O. Madanapalle Range, is granted privilege leave for one month and seven days.

M. R. Ry. K. G. Sundara Raja Rao, Ag. R. O. VI grade is posted to the charge of Madanapalle Range.

29TH JULY 1919,

Mr. H. W. A. Gaudoin, E. A. C. on return from Military duty to be D. F. O. Lower Godavari.

Pending arrival of Mr. B. F. Rigold or until further orders Mr. J. F. Bryant I. C. S., Collector of the Nilgiris to carry on the duties of the D. F. O. of the Nilgiris in addition to his own duties.

Mr. R. B. Cornwell. E. A. C. to be Instructor in the Forest College, Coimbatore, during the absence of Mr. E. M. Crothers.

M. R. Ry. P. K. Kuttappan Pillai, Ag. R. O. is posted to the charge of Sriperumbudur Range.

M. R. Ry. V. D. Ramalingam Pillai, Ranger V Grade *Sub-protem*, is reduced to the bottom of the VI Grade with effect from 1st May 1919 the date of his suspension and that he be considered as on leave on loss of pay till 31st July 1919.

M. R. Ry. V. D. Ramaligam Pillay, R. O. on return from leave is posted to the charge of Horur Range.

M. R. Ry. K. S. Ramayya R. O. is transferrdd to North Malabar, to the charge of Chedleth Range.

M. R. Ry. B. Sambamoorti Ayyar, R. O. is transfered to North Mangalore Dt. to the charge of Coondapur Range.

M R. Ry. R. Gurusawmi Ayyar, Ranger, I Grade is transferred to the Nilgiri's Dt. to the charge of Mudumalai Range.

5TH AUGUST 1919.

Mr. Stephen Cox, chief conservator of Forests, has been nominated to be an additional member of the Legislative council of the Governor of Fort Saint George.

Mr. Harloe Irwin, to be Forest Utilisation Officer.

Mr. G. C. Robinson, Assistant conservator of Forests, South Malabar has been declared by the Board to have passed Tamil Higher Standard prescribed for members of the I. C. S.

The following who came out of the M. F. C. with Higher standard certificates are appointed temporary Rangers, VI Grade on probation for one year.

(1) K. Purushothama Rao, South Cuddapah and Anantapur.
(2) C. N. Narasimha Achari, Chittoor.
(3) N. C. Mahadevan, Guntur.

The following temporary Rangers VI Grade, are confirmed.

(1) A. Vyasulu, Kudligi Range, Bellary district.
(2) A. Bhaviah, Chamala Range, Chittoor district.
(3) A. Muthu Krishnan, Porumamilla Range, N. Cuddapah Dt.

The following confirmations and promotions are ordered.

J. S. Rowland, to be Ranger, VI grade without prejudice to his acting appointment as R. O. IV grade.

A. D. Fenn and C. Vasu, to be Rangers, VI grade, from 1st July 1918.

P. Sankuni Menon, to be Dy. Ranger, I grade and to act as R. O. VI grade, South Mangalore Dvn. from 1st July 1919.

M. Gulab Singh, to be Dy. Ranger, I grade, and to act as R. O. VI grade, the Nilgiris (as Asst. R. O. Mudumalai) from 1st July 1919.

B. Coates, to be Dy. Ranger, II grade, and to act as Ranger VI grade, North Malabar, from 1st July 1919.

9TH AUGUST 1919.

M. R. Ry. L. S. Krishnan Avergal, Pro. E. A. C., privilege leave for 1 month and 14 days from or after 15—8—1919.

Mr. T. Clear, Dy. Conservator of Forests to be D. F. O, Tinnevelly *cum* Ramnad.

M. R. Ry. T. Subbarayulu Naidu, R. O extension of privilege leave for month from 10—8—1919.

27TH MAY 1919.

Mr. S. Cox, Conservator of Forests, III grade, to act as Conservator of Forests, II grade, from 8th February 1919 up to and including 31st May 1919, vice Mr. H. B. Bryant on furlough.

Mr. Henry Tireman, Dy. Conservator of Forests, to act as Conservator of Forests, III grade, and to be incharge of Western Circle during the absence of Mr. C. D. McCarthy on leave or until further orders.

M. R. Ry. J. Sadasiva Ayyar Avergal, D. F. O. North Mangalore, to be D. F. O., South mangalore.

M. R. Ry. A. R. Narasimha Ayyangar Avergal, E. A. C. of Forests, to be D. F. O. North Mangalore.

Mr. A. B. Jackson, Dy. Conservator of Forests, to act as Conservator of Forests, III grade, and to be in charge of the Southern Circle during the absence of Mr. H. A. Latham on leave or until further orders.

M. R. Ry. S. V. Devadasan Avergal, D. F. O., Chingleput, to be D. F. O., Madura, and until relief by Mr. D. T. Barry, to be in additional charge of Tinnevelly cum Ramnad.

M. R. Ry. M. C. Chandy Avergal E. A. C. to be D. F. O., Chingleput.

Mr. A. M. C. Littlewood, E. D. C., *Sub-protem* on return from leave to work under the D. F. O., Chittoor.

M. R. Ry. K. M. Gopala Achari R. O., IV grade *Sub-protem* on return from leave is posted to the charge of Sriperumbudur Range, Chingleput Dt.

Mr. R. E. Lemos R. O., III grade, on return from leave is posted to Tinnevelly Dt. on special duty in connexion with road works in the Dt.

3RD JUNE 1919.

Mr. A. M. C. Littlewood E. D. C. to be D. F. O., Chittoor during the absence of Mr. C. C. Wilson on leave or until further orders.

Mr. T. A. Whitehead, D. F. O., West Kurnool, to be in charge of South Kurnool in addition to his own duties.

M. R. Ry. A. Hanumantha Rao Avergal is confirmed as E. A. C. with effect from 25—1—1917.

Consequent on the return of Mr. C. H. Ashe, Ranger, V grade, from military duty the following arrangements are made :—

(1) M.R.Ry.K. Jayaraman to continue to act as R.O. VI grade *Sub-protem* Vice K. Syed Edulla Sahib retired.

(2) B. T. Sitaraman Ag. R. O. VI grade tobe Temporary Ranger VI grade vice Mr. B. R. Salisbury appointed as Instructor V. T. School.

(3) Mr. S. F. Lobo temparary R. O. VI grade to revert as Dy. Ranger II grade but to continue to be in charge of Pappireddipatt Range.

10 JUNE 1919.

M. R. Ry. Aaron Appadurai Pillai Avergal, Dy. Collector VI grade to be Personal Assistant to the chief Conservator of Forests.

Mr. E. M. Crothers, Instructor, M. F. C. Coimbatore is granted privilege leave for three months from or after the 15th August 1919.

Mr. C. M. Hodgson Dy. Conservator of Forests, to act as Conservator of Forests, III grade and to be in charge of the Northern circle from or after the 1st June.

P. K. Kuttappan Pillai Pro. Dy. Ranger I grade to act as Ranger, VI grade and posted to the charge of Vempalli Range vice M. R. Ry. R. Krishnaswami Ayyar Pro Ranger resigned.

V. S. Rangaswami Nayakar, Dy. Ranger, I grade to act as Ranger VI grade and posted to the Charge of Chitvel range vice M. R. Ry. T. Paramasiwam Pillai granted leave.

THE

Madras Forest College Magazine.

Published Quarterly.

Vol. IV. December 1919. No. 2.

Visit of their Excellencies to the College.

September 17th and 18th were perhaps the two most successful days in the History of the College. On the 17th at 10-15 hrs. His Excellency Lord Willingdon accompanied by his Private Secretary, an Aide-de-Camp, and the District Magistrate arrived at the College, where he was met by the Chief Conservator, the Board of Visitors, the Principal and Staff, and the Chief Secretary to Government. After the students drawn up in double file had been inspected, His Excellency and all Forest Officers present were photographed with the students.

A move was then made to the Engineering Park where the various apparatus, such as Fire Station, Derrick, Shears, Fuel slide, bridges &c., were explained by Mr. Cornwell, the senior engineering instructor. The site of the Students' Club was next visited, and the foundation stone was laid by His Excellency, the silver trowel with a sandal handle being accepted by His Excellency as a memento of the occasion.

The combined leave granted to Md. Asadulla Ghatala Sahib, R. O. is extended by six months.

Abdul Khalak Sheriff, transferred to Kurnool East for charge of Morricheruvu Range and will act as Ranger VI grade from date of taking charge.

B. Gulam Dastagir Sahib, R. O, is granted extension of leave for 3 months.

M. R. Ry. K. R. Krishnan Nayar, R. O., The Nilgiris, is granted Extension of combined leave for 6 months.

26TH AUGUST 1919.

Mr. F. R. Madan, Dy. Conservator of Forests, extension of privilege leave up to 30th September 1919.

In the vacancy caused by the death of M. R. Ry. Panchapakesa Ayyar Avergal, E. D. C., Mr. H. W. A. Gaudoin. E. A. C. of Forests to be permanent E. D. C.

In the vacancy caused by the deputation on foreign service of M. R. Ry. V. Raman Menon Avargal, E. D. C., Mr. E. M. Crothers, E. A. C. to be E. D. C., *Sub-protem*.

Mr. C. J. Van Halften, Pro. E. A. C. is appointed to the chage of Middle and North Andamans Forest Division, with effect from the 21st July 1919 and until further orders, during the absence of Mr. M. C. C. Boing, E. D. C. on special duty.

The one month's privilege leave granted to Ranger M. R. Ry. S. Ramachandra Ayyar, is extended up to 24th August 1919. The existing arrangement will continue.

M. R. Ry. K. G. Sundara Raja Rao, Ag. R. O. Sixth grade is granted privilege leave for one month, on relief by M. R. Ry. T. Subroilu Nayudu.

Mr. C. S. King, R. O. is granted privilege leave for 3 months with effect from date of relief.

M. R. Ry. R. Guruswami Ayyar, R. O is transfered to South Malabar division for special duty.

M. R. Ry. P. Govinda Menon Avargal Pro. E. A. C. (on leave) is transfered to Nilgri division to the charge of Mudumalai range. This cancels Ranger Guruswami Ayyar's posting to Mudumalai.

M R. Ry. K. S. Ramiah R. O. is granted privilege leave for one month on relief by Ranger T. Kondathu Goundan.

M. R. Ry. K. S. Ramiah, R. O is transferd to North Malabar to the charge of Begur range-on the expiry of his leave. This cancels his posting to Chedleth range.

M. R. Ry. C. Srinivasa Rao, R. O. is granted leave on private affairs from 28th July to 11th August 1919.

M. R. Ry. M. Ambu, R. O. on working Plan duty is transfered to North Malabar division to charge of Chedleth range.

In asking His Excellency to lay the foundation stone of the Students' Club, the Principal stated that the proposal to build the institution was originally made to Government in 1915 but the financial stringency of the times and the formidable nature of the D. P. W. estimate proved an insurmountable barrier. Nothing daunted by the set back, Mr. Dawson (who during his 5 years' tenure of the post of Instructor at the College was ever alive to the interests and happiness of the students) undertook to collect funds for this project. A large amount was promised by the then present and past students, and a sum of Rs. 247 was realised. In July 1918 Lord Pentland, while making one of his not infrequent and always welcome visits to the College asked if any additional prizes &c., were required, he was informed that there were sufficient prizes but that the absence of Students' Club was a serious disability. Lord Pentland promised to further the project on his return to Ootacamund, and was good enough to take down some notes as to details of cost &c. On the 13th November last year, the news of the Armistice reached the College, and before going down to the town to take part in the public rejoicings, the Principal addressed the Government with a view to getting the project pushed through as an appropriate memento of that happy occasion. In the same month an effort was made to ascertain exactly how much was outstanding and how much was actually in hand. It is to be regretted that 7 months elapsed before the necessary information could be elicited from the individual responsible. Had it not been for these 7 months of uncertainty, there was no doubt that His Excellency would now be opening the Club instead of laying the foundation stone. But the former was, it was hoped, but a pleasure postponed. The Government's response to the Principal's request was both prompt and gratifying and amounted to a promise to contribute Rs. 2000 provided a like sum were raised elsewhere.

In July, an appeal was issued to all Gazetted Forest Officers and old students, with the result that by now Rs 2655 had been collected. Of this sum, the Gazetted Officers had subscribed Rs. 1330, old students Rs. 455, and the present students, the Principal was grateful and proud to say, had raised over a thousand rupees. Of this latter item Rs. 100 had been contributed by Senior Student Nagalingam who thereby became a Patron and entitled to have his name inscribed on the tablet of Patrons of the Club. There was a balance of over Rs. 1000 still due from promises of old students and it was anticipated that within the next month or two the whole of this sum would be realised.

The scheme prepared recently by Mr. Crothers, Instructor now on leave, included one room 50' × 20' containing a Stage (for, the Theatricals were now quite a special feature of the College), a small library, and another room. The plan of this project was drawn by ex-student Sankunni Menon. The estimate and design were then submitted to a Select Committee of which Mr. Cornwell, the present House Tutor was the Chairman. It was found necessary to cut down the dimensions &c., and so far as funds permitted at present, it was not possible to add the Library or Stage. There was thus ample scope for expenditure of further subscriptions. The foundation stone was prepared and put in place by Mr. Hart, the Executive Engineer of Coimbatore Division, who despite his arduous and multifarious duties always found time to do the Forest College a good turn if the Fates were propitious. The *Raison D'étre* of the Club was to provide a place where the Students could dispose themselves at their ease and talk on all and every subject except politics. At the Forest College there were no politics. The old Latin tag "*Dulce Est Desipere in Loco*" freely translated by the observation "how

sweet it is to slope about." best exemplifies the object of the Club. We all liked moments of relaxation; and it was only right and natural that we should, and therefore, as His Excellency had a long and arduous morning before him, the speaker would detain the Company no longer but would ask His Excellency to honour the College by laying the Foundation Stone of the Club which the speaker was confident would prove a source of pleasure, convenience, and benefit to past, to present and to future generations of Madras Forest College Students.

His Excellency then made the following reply before laying the Foundation Stone:—

"Mr. Cowley-Brown, Gentlemen and students:—I wish to thank you very much indeed for having given me this opportunity, on the first occasion that I have come here in rather an official capacity, of taking a practical interest in the amenities of life and the comforts of you young men in the Forest College. I understand and I am delighted to hear that you young men yourselves have collected a large sum of money towards the erecting of this club. I am also glad to hear that the old students have promised to give a certain amount. That shows, and I hope I am right in my idea, that there is a feeling, when boys go away, of *Esprit de corps* and recollection of their old school which is always the essence of school life. There is one word I would like to say with regard to subscriptions. I do not know whether you have honorary members. If you have I may assure you that His Excellency the Governor will be glad to give you Rs. 100 for any purpose connected with this building. (Applause). I do not know whethet it is possible for you to have lady honoraty members. If it is, I am quity sure Lady Willingdon

would want to give you Rs. 100. (Applause). Therefore, in anticipation, I offer you Rs. 100 on her behalf. (Applause). You have made the remark, Mr. Cowley-Brown, that this Club is for social intercourse, recreation and social amenities of life, outside school time. You have also said, and I have on doubt you are quite right, that there was one thing you are quite sure will never be discussed here, and that was politics. Well, I am bound to say that I sincerely hope you young gentlemen, are here to work, and are not going to pay too much attention to politics. I have been at College myself for a good many years, and I did not think about politics then. If you take my advice, although it is an excellent thing for you to know about public affairs, in this country, you need not worry your heads about politics. Wait till you are much maturer in years than at the present time.

"Well, I have just a few words to say to you on general matters of forest administration. I do not know whether you know that the Governor, is as far as the Goverment is concerned, the departmental head of the Forest Department. I, for six years, was the head of the Forest Department in Bombay and it gave me a great deal of interest, a good deal of occupation and I think we progressed a good deal. Now, I want to tell you, gentlemen, in the presence of your Chief Conservator, what I feel about forests in this Presidency. You have a thing which we had not got in Bombay, a fine Forest College. But in Bomay they have got what you have not got here, that is a considerable development in the forests which I do not see in Madras. To me, the Forest Department is one of the most important departmental developments which we have got to undertake. As far as I am individually concerned, and I say so in front of your Chief Conservator, any

matters of development which he wishes to put forward I shall always support in every conceivable way I can. Let me tell you, if as I believe the forest industry is going to be one of the greatest industries of the country in a few years' time and the Madras forests have to develop, it is essential that you should profit by your instructions here and become efficient, so that you may be really useful officers and help us in their development. Let me say, I shall always take the keenest interest in your education and your welfare and you will probably find your Governor will be often running down to Coimbatore to find how you are getting on." (Applause).

One of the Provincial Officers' bungalows was next inspected, and the project for adding 2 rooms each 20' × 20' and 2 bath rooms was accepted. These improvements will give the accommodation that can be reasonably expected for the rent leviable on the pay of the occupants.

The party now reinforced by the presence of the Surgeon General motored to the Sub Assistant Surgeon's quarters, the Clerks' houses and the College well. The out-standing problems were satisfactorily adjusted, *in situ*.

The next item on the programme was the planting of a ***Bassia longifolia*** near the Museum, and next to the ***Ficus Benjamina*** planted by Lord Pentland in 1915. Eventually this plot will be known as Governor's Grove. Half an hour was then spent in the Museum, and after the situation had been explained, His Excellency decided that extension by wings (one of which should be convertible into a Prize day Hall) was very necessary.

At the Gymnasium the party met Her Excellency, Lady Willingdon, Mrs. Cox, Mrs. Cowley-Brown, Mrs. Campbell, and

Mrs. Gifford: they had previously visited one of the Hostels. A demonstration on the Parallels, Rings, Horizontal bar, and in groups was given by a picked team of students led by Senior Student Venkateswarulu and instructed by Havildar Kadir Baksha. Venkateswarulu concluded the exhibition with several grand circles. His Excellency complimented Mr. Cornwell and the Havildar on the excellent training evidenced by the exercises.

Her Excellency then planted an "*Achras Sapota.* (Sapodilla)" tree next to that of His Excellency.

The main building of the College was next inspected, and while the Ladies escorted by the Staff visited the Museum, His Excellency discussed matters with the Board of Visitors, the Principal, and the Chief Secretary. Their Excellencies then lunched in the Principal's house, where the party was joined by Mrs. Jackson and Mr. and Mrs. Wimbush. Shortly after 4 p. m. Their Excellencies returned to Coimbatore.

On the 18th the Athletic Sports were honoured by a visit from Their Excellencies, who thoroughly entered into the fun of the fair and evoked great enthusiasm by their obvious enjoyment over simple diversions. Her Excellency, who took a practical interest in the Log Cutting and other competitions herself organised a new competition—the Willingdon mêlée, i. e., a sack fight the Department versus the World. This event will now be standardised. The satisfaction in defeating the world was tempered by the unfortunate accident that befell General Gifford the Captain of the World's Team, who fell and fractured two ribs. Her Excellency presented Mr. Cornwell the sole survivor of the struggle with a silver pencil case, and the Forest Team as winners literally "took the biscuit."

The following records were established at this year's meeting:-

100 yards Flat Race.	Old Students.	C. S. Nanjappa. 12 seconds.
High Jump.	J. A. Muliyil.	4 ft. 11¼ inches.
One Mile.	M. B. Subbiah.	5 Min. 32 seconds.

In asking Her Excellency to distribute the prizes to the winners, the Principal remarked:-"We are indeed grateful to Their Excellencies for making the effort to visit us a second time after a heavy and tedious programme on the Estate yesterday. It is moreover a special compliment that is being paid to us today. For, this is the first occasion on which the Governor of Madras has been present at the College sports and yesterday was the first time that the Forest College Estate had been honoured by a visit from the wife of a Governor of Madras. But we are further blessed today, for, I want you students to realise that all ladies have the "Forest eye". I know it. For 5½ years, I have known it, that all ladies are possessed of that gift so essential to members of our service, namely the "Forest eye"—the eye that is quick to note sins of omission and sins of commission and yet equally prompt to recognise merit when it is earned. Those of you, students, who are married doubtless know it already; those of you who are not married will find it out for yourselves some day. I don't think that much escaped Her Excellency's eye yesterday, and I anticipate that the new light brought to bear on our problems will operate to the marked and early benefit of the College.

"I am particularly glad to see so many Indian ladies and gentlemen today. For I want them to realise something of the conditions of a Ranger's training and especially of the difficulties with which he is faced on leaving the College. He comes to us the product of his late environment. We here endeavour to impress upon him such favourable conditions as we are able to assemble. When he leaves us, his actions will to a great extent be influenced by his future environment. And I would wish that some of the professional orators in the Legislative Council would realise that those local conditions sometimes make it none too easy for the Ranger to do his bit.

"To the old students especially we offer a hearty welcome, for, it is to a great extent, the old students who made our traditions; and it is for you, present students, to maintain, to continue, and to improve on them.

"We have had our little ups and downs of furtune within the ast few days. The inclement weather has demonstrated much more adequately than any scriptory effort of mine how poor and insignificant is the accommodation afforded by our wartime pavilion. Then again our refreshments today are not what we should like them to be. The fact being that though the railway receipts have materialised the goods have not, and I must therefore ask you to ascribe to the vagaries of the Railway Company and not to any lack of good intention on our part, the deficiencies of hospitality.

"Turning to the sports this afternoon, we have produced no Flyers but on the whole what is much better, namely, a fair average exhibition of effort. There was not enough training this year but in future we shall take steps to remedy this defect. The Richmond Cup for the largest number of marks earned at these sports has been won by student Juriansz. Athletic colours have been gained by students Juriansz, M. B. Subbiah and J. A. Muliyil. I have to thank those ladies and gentlemen who kindly officiated as Judges, Starters, Time-keepers and Referees not forgetting the lady handicappers of

the babies. The Referees' task was almost a sinecure, as I think in all well-regulated meetings it should be.

"We are greatly indebted to several generous donors of prizes. Her Excellency has given a prize for the log cutting competition: the Mannarghat Mupil Nair, a Silver Cup for the Mile race, the Chief Conservator, the Prize for the Half-Mile Invitation Race, Mr. Longrigg, that for the hurdles, and Mr. Cornwell a silver cup for the Quarter. But we are indebted to Mr. Cornwell for far more than his prize. For it is due to his expert knowledge and indefatigable energy that we have made of the meeting such success as may appear to be merited. Mr. Cornwell is himself a first class athlete, and as Vice-President of the Athletic Club he has been the mainspring of the meeting from start to finish. As His Excellency observed yesterday with reference to the Gymnastic display he has indeed been the power behind the Throne.

"But time is fleeting and Your Excellencies have yet a rail journey before you, and therefore I will restrain no longer the impatience of those to whom prizes are due; but I will only say "please come again," and I will now ask your Excellency to complete the happiness of the day and to fulfil your promise by gratifying the successful competitors in presenting to them the rewards they have gained."

His Excellency, in replying, said, that he was delighted to find that this was the first occasion when a Governor attended a Forest College sports, and sincerely hoped that "Forests" would attack the World as on this occasion, and defeat them (Applause.) His Excellency knew well that Lady Willingdon was one of those people who after an experience of some years had the gift of a forest eye, and he would appreciate her sense of quick perception. As she

was also an honourary member of Students' Club, His Excellency hoped that with the influence of Lady Willingdon's forest eye the students would learn to do their duties thoroughly well and thereby push forward their College. After thanking them all for their kind reception His Excellency hoped that he and Lady Willingdon would visit the College often, especially on sports days.

Their Excellencies then said good bye to by far the largest company that has witnessed our sports and took their departure amidst the regrets of those to whom their bonhomie and friendly kindness had brought so much pleasure during the past two days. The band of the Vellore Police School played an admirable selection of music. The Police arrangements under Mr. Blackstone D. S. P. and Sergeant Jones were thoroughly efficient.

Their Excellencies have presented their photographs to the Students' Club, and to the Museum.

His Excellency has expressed his great satisfaction with the tone, methods and results of the College.

So ended two cheery, busy and profitable days.

Sind Forests.

Forests in Sind have been in existence since the days of 'Mirs' as some areas with tree growth were always maintained to invite game for the purpose of their hunting and shooting and as such they were generally called 'Shikargahs'.

The increase in the area under forest began from the year 1878 when the Indian Forest Act now in force was enacted subjecting the

forests to a more or less systematic protection and providing for the afforestation of new lands. Since then the area under forest control has continued to increase as most of the unassessed, unoccupied lands at the disposal of Government and suitable for forest purposes are being brought under forest control as soon as they are found available.

Legal position of Forests

All the areas at present under-forests have been declared Reserved Forests under Section 19 of Indian Fores Act and the Rights and Privileges in them duly settled and recorded as required by Section 4 of Indian Forest Act. But no rights or easements have been admitted or allowed in the forests maintained from the days of 'Mirs' as no such right existed or can be alleged to exist in them in favour of any person.

Division of Forests and their control.

The total area of Sind Forest circle comes to about 740,000 acres and is divided into five divisions, namely, Karachi, Hyderabad, Larkana, Sukkeer, and Stukarpur. The circle office is stationed at Karachi and is in the charge of a Deputy Conservator of Forests. Each Division is under the control of a Divisional Forest officer of a rank not less than the Extra Assistant conservator of Forests. The Divisions are called by the names of their respective Head Quarter towns which are also usually the Head Quarter Stations of collectors and other District officers But the forest boundaries of each division seldom coincide with those of the Revenue collectorates. Each Division is made up of four or five ranges. A Range is composed of some ten to twelve forests and the forests in turn comprise one or more felling Series.

Types of Forests and their situation.

Sind forests are generally classed as under :—

I. Riverain, also called Riparian; *II. Inland.*

I. Riverain Forests are those which fringe on either bank of River Indus or are situated so close to it that they depend for their irrigation solely on the river spill. This belt of forests begins from 'Roanti' (just near the place where the river leaves Bahawalpur state and enters British territory) and goes so far as Keti-Bandar (near the place where the river enters the Sea) a distance of about 5 to 6 hundred miles. These forests are the typical forests of Sind and are more contigiousin Lower Sind than in Upper Sind.

II. Inland Forests.

Forests which are away from the river, and are irrigated by sluices in Public Works Department embankments, and canals, are termed Inland Forests. The water supply of these forests is in no way assured, for the forests have a claim to the surplus water in the canal only. Therefore, the Forest sluices are allowed to work to their full capacity during abnormal floods. Consequently these forests are poorly stocked.

Species.

The following are the species growing in Sind Forests:-

Dalbergia Sissoo	Called	Tali.
Acacia Arabica	Do	Babul
Prosopis specigera	Do	Kandi
Papulus Euphratica	Do	Bahan
Tamarix gallica	Do	Lye

Dalbergia Sissoo.

It is not the naturally growing species of Sind forests but is artificially raised generally by transplanting. It is the most valuable species of Sind Forests as it is the only tree which yields a good amount of timber. Owing to the vagaries of the Indus it is not practicable to raise 'Talis' on river banks or in its proximity so as to avail of flow irrigation. Therefore 'Talis' have been planted and raised by lift irrigation over an area of about 200 acres. but the results have not been quite satisfactory. It will be possible however to encourage Tali plantation to a greater extent and with a better chance of success when the proposed 'Sukkeer Barrage' scheme is completed.

Acacia Arabica.

Acacia Arabica is the principal indigenous species of Sind Forests. It is a light demander & shallow rooted tree; reproduces from seed and easily succumbs to the effect of drought. It needs something like a foot deep water for about three to four months of the year and complete drainage. Therefore its is a habitat mostly of riparian forests where all its demands are adequately met with on higher levels it is usually found fringing the backs of depressions or water courses. It is affected to a great extent by frost, hence, it is found growing naturally under the shade of thin *Tamarix*, which serves as a nurse to the young seedling, but subsequently when Babul is established it overtops and kills the nurse. It has a tendency to grow gregariously and sometimes in its sapling stage forms so dense a crop, through which no man and scarcely any light can pass.

Thinning operations are therefore carried out in such areas from 12th to about 20th year of its age. It is worked on a rotation of 30 years. The bole of the tree and some of its straight branches yield a fair amount of timber and rafters; the rest is converted into fire wood

or charcoal. Its regeneration is effected either by broad casting or leasing out such lands to cultivators on the condition that they will raise alternate strips of Babul in the first two years and in the third year broad cost seed over the remainder along with the cereal crops. The latter process is adopted in cases where the level of the ground is a little higher or to keep down the grass which is very persistent, and the method has been found to be very beneficial.

Prosopis Spicigera.

It is a deep rooted tree and can thrive well even on percolation water, though it is not insensible to the advantage of a good water supply. When once established it can stand well the effects of drought. It therefore forms the principal crop of Inland forests where it lives on subsoil moisture derived through its deep roots. It yields a good quality of fire wood and charcool and more easy to work than Babul. It reproduces abundantly from coppice but is also artificially raised by broad casting or sowing with cereal crops in the same way as Babul

Papulus Euphratica.

It grows only on newly formed soils by the action of the river and principally on Sandy or Sandy loam soils; shallow rooted tree, easily affected by drought; Grows rapidly and puts on a girth of about 2 to 3 feet in about 15 years' time and if not felled at that period it soon begins to get hollow. It is found pure as well as in mixed state, but in the former state it seldom extends our a large area. As the level of the freshly formed soils is being constantly raised by annual silt deposits, it gradually disappears, being replaced by *Acacia Arabica* or *Prosopis Spicigera* according to the conditions of soil and irrigation. Its wood is light and soft and is used for rafters or lacquor work.

Tamarix gallica.

Is the inferior tree of sind forests. Reproduces abundantly from seed and coppice; Found almost everywhere in the forest as it can stand conditions both too dry and too moist. In the former state it usually assumes a bushy form but in the latter it grows very well. Its wood is light and is used mostly for firewood but when perfectly sound and straight, rafters are made out of it for cottage roofs.

Revenue Rotation etc

Sind Forests yield an annual revenue of something like Rs. 700,000, and are worked on a uniform cycle of 30 years for all the species, notwithstanding the different rate of increment in different species, owing to the reason that the constant shifting of the river to and from the forests bring about a correspondent change in their area in riverain forests. This in turn affects the distribution of species, for, an area covered with a dense growth of Babul may very soon be transformed into *Baban* or *Kavdi* forest if rethrown by the river after eroding it, owing to the change wrought by the river in its physical and chemical composition as well as its ground level. The Inland Forests are no doubt more stable than the riverain ones but as they depend for their irrigation on the surplus water of the canals and the river, a continuous low level of the river for some years would mean a period of drought for them and this would naturally result in the retardation of the existing growth. Owing to these complicate circumstances this uniform relation has been prescribed for all basing it on the average conditions.

In short, the primary duty of a Ranger in Sind is to make a complete study of the following points concerning his forests :—

(1) The sources of the water supply (2) water channels leading water to the Forests, if any, (3) their capacity and the average quantity

actually received, and (4) The level of his forests, so as to be able to make a judicious use of the available water supply.

K. R. Moorjani,
Junior Division,
Sind circle.

A Lecture by Captain Irwin on his Experience in Flanders.

On the 19th September 1919 Captain Irwin M. C. the Forest utilization officer, delivered a very interesting lecture on the above subject in "Gamble" at the Madras Forest College. He dwelt at length on the details of mining carried on the front of the infantry lines. His description of the construction of shafts to find out the mining activities of the enemy was instructive. At the end of his lecture he explained the doubtful points raised by the audience.

Shafts, their construction, object and uses:– Shafts are narrow deep pits dug into the ground vertically to post the listeners underground with a geophone to enable them to listen to the mere scratch of the earth by the enemy with clear distinctness. The sides of the shafts, are protected with durable timber. In certain cases, shafts, after reaching a certain depth vertically, are taken horizontally so as to prevent observation by the enemy. The inrush of air down the vertical shaft will go round the horizontal shafts and the listeners will thus have no inconvenience for want of air. The opening of the

shafts on the ground level will be covered and camuoflaged, to prevent detection by enemy aeroplanes. In addition to this some men are made to appear to construct bogus shafts or shaft materials are left scattered at noticeable places to set the enemies on the wrong line, while all the time real shafts are constructed elsewhere. In most cases shafts are connected with the camp by trenches for men to come under cover and work. In such trenches sometimes men have to wade along slough and mud knee-deep.

As soon as the listeners suspect any enemy mining activity, the direction from which the sound emanates, is determined by prismatic compass from many points. These readings are then plotted and the point at which most of the rays intersect is decided to be the line along which the enemy is mining. Immediately action is taken to bore underneath the enemy mine and blow it up. This work of countermining is done as quickly as possible and also in a gentle way so as not to allow the enemy to spot out our activity. Sometimes countermining has to be done so near the enemy line that light digging with a crowbar is to be avoided and earth is removed bit by bit by pushing in the end of the crowbar gently to a very inappreciable depth. In this way the whole intervening space between the two fighting lines is dug up by a net work of underground passages and mines are laid in strategic places. It even happens that the mines of the enemy are reached. In such cases charges laid by the enemy are carefully removed and placed as countercharges in defferent places. In removing the enemy mines great caution is required as the detonators of the charges are connected with a system of wires the centre of which may be in any unsuspected place. Any careless handling of anything found in the trench or treading will result in blowing up the whole system of mines. In another case one British

Soldier actually dug into the enemy mine line and there having come face to face with an enemy soldier killed him, walked through the enemy mine line and returned back with the enemy charges. (The bravery of such souls is beyond praise.)

The difficulties of men in the front. Men working in the mines depend for rations from the camp along the trenches and when the supply fails to reach them for some time death is inevitable; cases have occured in which men have heroically stuck to their duties in the face of starvation and the fingers of such men were found fleshless the same having been sucked up in the last moments of life.

Training of German and British Soldiers. German Mines were elaborate, and regarding men the general experience throughout the war was that they acted under orders. Once the source of order is endangered the activity of the whole line ceases. This shows that the training is no better than that of automatons. But in the British line the experience is otherwise. Once the control is lost some one else rises to the occasion and the army is led. Such is the contrast in the training; and it is no wonder that Germany lost in spite of its strong man power and that the British won with a small army.

T. M. DORAISAMY PILLAI,

9-10-1919.

[The great point of Captain Irwin's instructive lecture was that, he gave us in graphic and picturesque language, the first hand experiences of an officer who *did* things instead of writing about them. His work constantly called for instant action, and a minimum of reports. As such, the pleasant evening spent with him was of the utmost benefit to embryo rangers, whose tendencies are often just the other way. The lecture was delivered without notes and in free and vivid language that made each scene or crisis live before our eyes. At the

end, Captain Irwin descended from the platform, and the students were 'all over him' at once in their thirst for information as to further details. We hope it will be possible, subsequently, for Captain Irwin to come and talk to us still, more informally at the Hostels or in Camp. He is assured of a hearty welcome.]-Editor.

Root suckers in Dalbergia latifolia.

During my three years of service in South Kanara District in the two Ranges of Puttur and Kasaragod, I have been closely watching the natural regeneration of *Dalbergia latifolia* and I could find very few seedlings under seed bearers probably because there was very little light admitted to the Forest floor owing to the thick shade of undergrowth. Where there is sufficient light, but on entirely open space Dalbergia seedlings come up under parent trees in moderate proportion. Where the roots of these trees are injured by the raking up of the soil either by wild pigs or in road cuttings, root-suckers spring up profusely and with great vigour reaching a height of 3 to 8 feet in 6 months where the soil is rich in humus. In an improvement felling area of my range, I happened to observe a peculiar sort of reproduction by root suckers. In compartment 3 of Parappa Working Circle, improvement fellings were carried out in 1918—19, and according to the prescriptions of the working plan, only mature trees dead or dying, illformed or defective, and of and above a certain girth are felled. Rosewood trees are very sparingly marked for felling and in the course of felling, a very old top dead Rosewood tree was felled in the month of December 1918. The tree was so defective that no log could be obtained. At the time of felling, seedlings were entirely absent all round the tree. After about a week of

the outburst of the monsoons in June 1919 small seedlings appeared here and there and I thought them, to be germinations from seeds which escaped my notice at the time of marking. During my inspection of these seedlings last week, to my surprise, I saw the whole space of about 2 chains in diameter covered with a thick carpet of seedlings as occur under Hopea parviflora trees. Now I minutely looked into their origin and found them all to be root-suckers. The root system was not interfered with in any way and even wild pigs have not visited this place. The height of these seedlings varied from 6" to 2'. This spontaneous reproduction is noticed only in the case of this one tree though there are several old trees similarly felled in the same year in the same compartment. The coppice shoots that sprouted from the stump are all stunted and lifeless. I shall be thankful if any of the readers of the College Magazine will kindly enlighten me on this point.

K. C. JOSEPH,

5—9—1919.

[A reference to Pages 166 to 173 of Volume III No 3 of the Magazine will throw some light on the point.....Editor.]

Random Notes.

Recruitment of Guards: A number of guards have to be recruited under the new scheme which has lately been sanctioned by the Government. It is expected that Range Officers and District Forest Officers will be flooded with petitions for the appointment of guard's posts. I would suggest that there is no use of selecting

candidates from the applications received. We want men with common sense, good physique and moderate educational qualifications. The best method, it seems to my mind, would be to advertise for men, the selection to be made by a committee of two Forest Rangers, presided over by the District Forest Officer. Double the number of candidates required for appointment at a time should be selected, and they should be examined in such subjects as reading, writing and arithmetic, and also in physical feats, as running half a dozen miles, cutting trees, clearing lines, digging pits and so forth. To test their intelligence they must be asked to write on any simple subject relating to Forests. Those who proved themselves to be up to the standard in these 'tests' should be selected, the higher in the list immediately appointed and the rest kept in the reserve list for future appointments. In view of the enhanced prospects before them and the better kind of work expected of them, I should think, a system of recruitment as suggested above is highly desirable.

A Rangers' conference: A Rangers' conference is a desideratum in the Madras Presidency. The Madras Forest College has now trained a number of rangers, and in a year or two we shall probably have no range in this presidency unmanned by a trained ranger. In the College we have been taught the elementary principles of 'everything' that is required by a Forest officer. The College expects us to develop what we were taught within and without its walls. Each one of us would be learning one new thing or other in our practical life; and what is stale to one may be a revelation to the other. The Government are very much interested in the development of the Madras forests; and hardly a blade of grass or a branch of wood of any use should be left hereafter to rot in the forests.

Each ranger will have his * say on his interested subject; as such it is quite essential that, at least once in a year we all meet in a conference at Coimbatore on the last day of June, the prize distribution day of the College and the subsequent two or three days in July, and read papers on our interested subjects and have them discussed under the presidency of the heads of the department who assemble there during this time. Now that our pay and prospects are improved, none among us would grudge to spend a few rupees for 'a feast of reason and flow of soul'. And when we have demonstrated our usefulness in the direction, the benign Government would not grudge us travelling allowance, at least to those among us who intend reading any useful paper or any useful subject at the conference. As friends we lived in the College; as friends we parted but let it not be a parting for ever.

The future of tanning barks: Leather industry in India is now engaging the attention of the industrialists and several factories have been started for curing and tanning leather within India itself. The barks of *Cassia auriculata*, *Acacia decurrens*, *Acacia dealbata* and *Acacia melanoxylon* have been tested and found to be rich in tannin. It is expected that in view of the increased revival of tanning industry in India, and the competition from foreign countries, exploitation of raw produce for tanning purposes, would be on a scale which, had hitherto no comparison. The supply of the raw

* [While welcoming the suggested conference, we have to point out to the Rangers that the College magazine is another medium enabling them to be in touch all round the year, with their professional *Confréres*. Any Ranger can have his say, at any part of the year, in the magazine.]—Editor.

produce is a problem that could be tackled only by the Forest department. In commensurate with the large exploitation we are going to have, steps should be taken to grow these species in extensive areas. In South Kanara, there are extensive tracts of lands in the North Mangalore Forest division on the slopes of the Mysore Ghats which were intensely kumeried prior to reservation about 20 years ago. Now what we have in these areas is a rich legacy of creepers, weeds, canes, useless and unsound soft-wooded species which are of no good; and the future of these thousands of acres is not enticing to the forester. I would suggest that these areas may be kumeried once again; and sowings of these species experimented upon. A small beginning may be made and if the results are encouraging we can extend our areas. At the instance of M. R. Ry. A. R. Narasimha Iyengar Avergal, District Forest Officer, North Mangalore, I have sown Cassia auriculata seeds obtained from Coimbatore, in about 2 acres in Sukady reserved forest in Shankaranaraina range. The growth in these 2 acres was only scrub jungle previous to its cutting. If the sowings of the above species result in success, the extensive Forests above referred to would be paying as bark could be systematically exploited for tanning and the rest of the stuff for fuel.

Under-planting in Nilambur :— I am glad that I mooted first this subject in the pages of this journal; and in concluding my note on this subject I had stated that I was 'conscious of having attempted the discussion of a problem not easy of solution.' I thank Messrs. Chaikku and Umapathi Mudaliar for raising discussions on the subject. I should indeed have been more thankful to Mr. Chaikku if he had my article before him for reference when he wrote his on the subject. I also thank the Editor, for his note that 'I do not blame

the wind'. In the absence of my article before him Mr. Chaikku says "The writer does not however explain how this state of the leaves contributes to a reduction in the humus on the ground. If he thinks that by virture of this easily breaking nature, the leaves disintegrate and get easily blown away by wind, I have but the same answer to this, as I have given against Mr. Mudaliar's theory of the wind." I am not, however, to explain statements which I have not made.

"The objects which those responsible for the attempts at mixing teak with these other species had in view, was, I think saner, surer and not very far to seek. While the white ants leave the ground bare of all dead vegetable litter, the pure crop of deciduous teak, leafless during the hottest months expose the soil to the baking heat of the sun for a considerable period of the year. So far as I understand, what they feared was the deterioration of the soil with regard to its physical properties etc." "The idea that underlay the attempts at the mixture and the idea that underlay under the proposed underwood to teak in Nilambur plantations, is all, I think to raise a leaf cover." "They fear that by deterioration in its physical properties, the soil may not be able to bear the same intensity of growth on a second rotation as on the first."

I have put Mr. Chaikku under inverted comas and now I shall put myself under them with reference to this subject. [Vol. 1 pages 16—17 of the Journal.] "This would merely be the effects of exposing the soil to direct sunlight and the drying action of wind, as usually happens under a pure even aged crop of teak." "I venture to suppose that a soil with a uniform even aged deciduous crop throughout its whole period of development would not have contributed anything—taking the factors of the locality as well into consideration—for the betterment of the soil." "Even though the soil

may be very fertile to begin with, to maintain its fertility should be the forester's anxious care as otherwise the yield of timber per acre must decrease with the age of the crop." "Those responsible for the attempts at mixing" would probably have feared this also; and there is no reason to believe that their only fear was that "the soil may not be able to bear the same intensity of growth on a second rotation as on the first." If they had feared the deterioration of the soil and a decrease in the yield of timber per acre in the same rotation viz the first, I would not be found fault with, if I say, their view would have been still "saner". I am sorry I was not so very explicit as Mr. Chaikku to say "pure crop of *deciduous* teak, *leafless* during the *hottest* months exposes the soil to the *baking* heat of the sun."

Then again to put myself in inverted comas "The best means at hand in conserving the productive capacity of a soil under a deciduous species like teak is underplanting with ever-greens or semi ever-greens which would be in leaf when the teak would be leafless, protect the soil against exposure during the warmest months of the year and provide sufficient vegetable mould for its enrichent by the annual defoliation of the leaves.'

The above quoted passages from my article would show that I had not gone far to seek the "saner and sounder view". I went only so far as Mr. Chaikku went; but I went two years earlier than Mr. Chaikku; and I went from Coimbatore to Nilambur as a Madras Forest College student; but he had not to go anywhere as he had been in Nilambur itself for the last two years or so. "Defoliation by insects" is not new to me for I had already advanced this theory in my article.

Top ends and branches of teak trees in a teak plantation whether 'left by thinnings' or any other operation are not to be much

depended upon in the formation of 'constituent elements.' The time of leaving these in the forests is well nigh over; and what we now want is to make use of every bit of any valuable tree.' I understand that there are proposals for laying out tram lines in Nilambur teak plantations; and we have already had the appointment of a 'Forest Utilisation Officer' for the Madras Presidency. While matters are thus rapidly advancing, I believe that a profitable industrial use of the top ends and branches of such a valuable tree as teak is not 'far to seek.'

I did not 'quickly get to discussing suitability of species' as Mr. Chaikku thinks; but I did so only after stating all the reasons, in no way, a whit less than what he stated in his article on the subject. But I mentioned the species suited for underplanting in the same article after stating the requisites such species should have; and did not leave them for another article as I had no Mr. Mudaliar then.

No anxious attempt has been made by me — I don't know about Mr. Mudaliar — to mix teak with certain other species. Species for underplanting should have certain requisites; these were mentioned and then those species with such requisites also mentioned.

Of course to a College student it was not possible when he had gone there during his tours to get the "full history of the experiments carried out in these attempts" to make them 'interesting'. However, I shall read with interest "the full history of the experiments" to know which Mr. Chaikku had over two years' service and experience at the spot, and therefore could be written without any 'anxiety'.

Enquiry into Forest offences: Personal enquiry by Range Officers into cases reported by their subordinates is not possible even in one out of ten cases in a range where forest crimes are rife. It is a known fact that unscrupulous forest guards report cases against certain villagers out of ill-will or to defend themselves against charges of illicit removals of forest produce not actually detected by them. In doubtful cases, a personal enquiry by the Range officer would help a good deal to arrive at the truth of the Guard's report; but there are a number of instances in which the accused have failed to appear before the Range officer in spite of notices served on them. The Forest guard knows that in an enquiry of this kind truth will come to light; and he is clever enough to induce the ignorant accused to stay away by throwing some bait; and the Range officer's report to his District Forest Officer is submitted incomplete. In the Abkari department any offence reported by a Sub-Inspector is enquired into by an authorised Assistant Inspector or Inspector before the final report is submitted to the Assistant Commissioner. Those officers are authorised to summon accused in Abkari cases; and any failure on the part of the accused to appear before them for enquiring will bring him to serious trouble, or a warrant will be issued against him. The Abkari law allows this. If an Assistant Inspector or an Inspector could be authorised to do this, I see no reason why in a forest case, the Range officer should not be so empowered. This will be one of the methods to prevent corruption among lower subordinates and an incentive to villagers to approach the higher officers. Such enquires may do a good deal to bring to light many of the vagaries of the unscrupulous forest subordinates.

C. KARUNAKARA MENON,
Range Officer,
Sankaranarayana range.

The Dispersal of Fruits and Seeds.

Often has it been dinned into our ears in the lecture rooms, and often has it been shown to us in our various tours that the struggle for existence is not a phenomenon that is confined to animals, but that it extends even to plants. It is manifestly an advantage to the species that the seeds are removed some distance from the parent plant as it gives a better chance for the young seedling in the struggle for existence. This is so because of the removal of the competition to a certain extent which otherwise it would have with others of its kind in the matter of food, light, &c. Even amongst us, going on excursions, the Instructor leading at the head, and lecturing all along on all important points he notices on the way, how often has not the stronger student pushed the weaker aside in his eagerness to keep himself within hearing of the Instructor. Still the weaker only smiles, and avoiding the crowd, and rushing through the scrub jungle, if the path is narrow, and running if left far behind, manages to be within hearing of the Instructor. This we owe to the power of movements God has given to animals. Thank God that he has not bestowed this gift on plants as well, as otherwise we would have had a hard task in getting them, and even fuel one of the necessities of man would have been denied to us. Then by what means do the plants manage to remove themselves from the parents, and escape much of the competition? Many a time have been told in lecture rooms, and many a time have we read in our Botany text books that wind, water, and animals, act as a medium for the dispersal of seeds. This is only a theory. "More practical" and "less theoretical" is the cry in the Madras Forest College. When this is so, how far have we been able to see practically the various way by which the seeds are spread?

In Nedunghyam, we saw *Impatiens* (and, *Oxalis* in our own College compound). The fruits of these when ripe, become extremely turgid, burst open and eject their seeds with some force, and thus throw them some distance away. The siliqua of *Brassica Juncea* and the capsules of *Ricinus Communis* are examples of this kind, we noticed in Komuttiyeri and Walayar. Besides, *Strobilanthes*, found growing gregarious in Mundanthorai, we noticed many species of Acanthaceae, forming an under-shrub in almost all the forests we visited so far. The fruits of these are elongated, with a hardened placenta, and it was not without surprise, that some of us looked at the seeds being thrown out by the hard bristle like funicles when the fruit was pressed a little. Another example of a similar mechanism we have practically seen is that of *Justicia* in Walayar and *Ruellia prostrata*, in our College Estate, both of which, when the pericarp is wetted, opens out with a jerk, and the funicles that lie bent within the ovary straighten out, and in doing so throw the seeds some distance away. Especially the latter, *Ruellia prostrata*, will not be forgotten by some of us, who had the bitter experience of having had the fruit burst out in, and the seeds thrown about, the mouth when wetting the pericarp in the mouth.

Though not quite a familiar example, we noticed the legumes of *Acacia Suma, Acacia Sundra, etc* in Walayar, burst with a twist. *Peltophorum ferrugineum* in our College Estate is *one* of this nature. The bursting of these legumes with a twisting motion is a sure indication of the seeds being hurled away from the parent. This is not all. There are numerous examples of this kind, we have noticed in our various tours, but to describe them all, will be voluminous and therefore I confine to a few examples.

Achenes bearing pappus is a character of Compositeae, and the examples of this are common everywhere; and in our own college estate,

we have seen *Tridax, Eupatorium* & c. fruits blown by the wind easily. Still easier it is for the wind to blow the seeds with fine hair like that of *Cryptolepis Buchanani, Dæmia extensa, Calotropis gigantea. Dodonea viscosa, Cardiospermum helicacabum, and Physalis* are sufficient to illustrate the winged and inflated fruits which the wind finds no difficulty in carrying with it.

Among trees, the most important, Teak the fruit of which though heavy, the persistent calyx, acting as a balloon, helps it to be blown off the parent plant. *Hopea, Pterocarpus Marsupium* and *Hardwickia binata* have winged fruits. In Nilambur, and Kodimadi, we saw thickets of young saplings of *Hopea* about 100 yards away from the parent plant. Rosewood, *Vengai* and *Hardwickia binata* seedlings were noticed well away from the parent plants in our various tours, and of *Vengai* was particularly marked in Mundanthorai M. F. C. experimental plot in which last year when enumerating the *Vengai* seedlings, some were noticed about 150 ft. from the mother tree.

The *Vengai* fruits drop off late in March and April and the featherlike wings take fire quickly, and is a great source of danger to our forests, if the tree happens to be by the side of the fire line and outside the reserve, and the fire line not wide enough. Should any fire break out in such a place, in all probability, the fruit catches fire and is blown far into the Reserve, by the wind, that is naturally created by the unequal heating of the atmosphere, caused by the fire itself, and of this I had a personal experience in Coorg.

Of the trees bearing winged seeds, may be mentioned *Oroxylum indicum*, (plenty of these, we noticed in Walayar); *Holarhena antidysenterica, Bombax malabaricum*, and *Wrightia tinctoria* are common examples of seeds bearing fine hair, or threads, and these were common in all our tours.

Lagerstrœmia seeds, (we noticed in Nilambur, and other tours) though very profuse, are so small and light that wind will never find it difficult to blow them off.

It is not all fruits and seeds that are provided with wings, and that can be blown by the wind. The *Balanocarpus* seed we saw at Kodimadi, cannot be blown by even the strongest wind beyond a few yards. Still we were not able to see some saplings without a mother tree near by nor was there any sign of parent tree cut in Kariar on the bank of a temporary streamlet, disbursing its tributes to the river Tambraparni. We all concluded last year that the seeds must have been brought down by the water of the streamlet from a very long distance.

Jack and Mango seedlings, coming up in the droppings of elephants and pigs have frequently been noticed. Here, the perianth of the Jack fruit and the pericarp of Mango are sweet and are much liked by the animals. The testa of the Jack seed and the endocarp of mango are hard, and pass through the alimentary canal of the animal without sustaining any injury. *Melia dubia* is another example of this nature, we noticed, dropped by the deer in Nilambur.

Of the shrubs special mention may be made of *Lantana* in Coorg which was introduced about 40 or 50 years ago as an ornament in a garden. It has now spread throughout the length and breadth of this little country and covers up about 1/3 of the whole area. The fruit of this is a sweet drupe and voraciously devoured by man, beast and birds and all these have jointly contributed to their spread. *Mimosa pudica* is fast usurping the Coorg soil bordering Malabar where it is abundant Cattle coming from Malabar have been the chief agent of spread here It was invariably found, wherever these cattle left their droppings, there appeared some seedlings of this shrub.

Triumfetta, Urena, Achyranthes and numerous others have none of the qualities that would attract an animal We have seen them in all our camps, but Walayar will stand foremost in our memory, whenever we have to think about these fruits, as it is here that these have given us the utmost trouble it is capable of, as they were then ripe and ready for dispersal. The hooks on the fruits of *Triumfeta* and *Urena*, the persistent and spinescent bracts and bracteoles and perianths of *Achyranthus* aid these fruits to attach on the body of the animal, that happens to come in contact with these. Not a day passed in our excursions in Walayar forests without these clinging on to our putties and stockings like a leech, we trying, to remove and throw them away and finding it an endless task and in utter disgust and despair of ever getting rid of them completely come back to our tents and there spend some of our precious time in detaching them from our dress. It will not be much to expect a crop of these to form a dense mass in the Walayar forest rest house compound in course. When we found so difficult to get rid of these fruits it is not a wonder that *Martinia diandra* (we saw growing in Mt. Stuart, Walayar and Komuttiyeri) came all the way to India from America by attaching itself with its hooked seeds to the wool of sheep when the latter was imported.

Not only in Ootacamund and Coonoor but in various other places have we seen various trees like Cupressus, pines &c. planted in the compounds of bungalows and houses and other buildings. These are planted there to improve the artistic beauty of the building with their ornamental appearance and for this sake they have been brought from long distances.

Of shrubs special mention may be made of roses. The real rose in true natural state, so far was seen only at Ootacamund and Coonoor in all our tours. Though devoid of the above qualities, the sweet scent

and the beauty of the flowers have conquered every lover of nature in the world and this shrub has invariably found a place in almost all the flower gardens and there stands foremost in all its glory and rightly called by the naturalist 'The King of Flowers'.

B. S. CHENGAPPA,
Senior Student,
Madras Forest College, Coimbatore.

Sport in Ceylon.

An article of this nature may seem rather out of place in a College Magazine, but I am inclined to think that it would interest some of its sportsman readers to know what sport we get in Ceylon. The jungles of Ceylon where game of all kinds from elephant to snipe is plentiful, and the running streams, glades, paddy fields and old tanks are enough to delight the heart of any sportsman

One of the pastimes much in favour of is, night shooting at waterholes for leopard and bear. This sounds unsportsmanlike or rather like poaching, but for various reasons peculiar to the island it is looked upon as legitimate sport, and as one of the ways of destroying these nocturnal animals which are very dangerous. This kind of sport can be indulged in only during the dry season, about the middle of July or so when the moon is full, and one who has been in it even once cannot fail to notice the romantic charm and fascination it carries with it. It was late in July that I once went on one of these expeditions with a planter friend of mine.

No rain had fallen since May and the moon being nearly full, everything pointed to a successful shoot. Having sent our saman ahead, we got on our bicycles and rode to a place called Raugalle, where our saman awaited us, at a half ruined P. W. D. bungalow; about 2 p. m. we started for the waterhole, with our tracker Kandan, and after a tramp of about four miles through rocky scrub jungle, we came to an insolated wild spot, where we found a slimy pool in a low lying rock. This is the waterhole.

We had a look at the surroundings. This is the ideal haunt of the bear and leopard and we found fresh tracks of bear leading to the waterhole, a sure sign of good sport to follow. These animals prefer such pools to quench their thirst after sunset, to rivers and lakes, owing to their timidity and as they feel more at home in the seclusion of the jungle.

It is now nearly 6 o'clock and daylight is on the wane. We settle ourselves in the ambuscade, which is a low breastwork of loose rough pieces of rock, overlooking the waterhole, with our guns loaded and ready. Numerous kinds of brightly plumaged birds appear at this time and animate the scene, twittering and taking a parting drink before retiring to rest, and among them a jungle cock, strutting about in a dignified manner, and now and then giving a shrill crow. The scene changes again, all bird life has vanished, the sun has gone down with a roseate glow and the moon is appearing over the tops of the low lying distant trees. Every thing is still and with our eyes just above the breastwork we peer into the darkness of the bushes before us, eagerly listening for any sound that may indicate the approach of the quarry.

We have not long to wait. A rustle of dry, fallen leaves indicates the approach of something. "Karadi" whispers Kandan,

our tracker. It is a bear. It slowly ambles on to the light grunting and sniffing; as it approaches the waterhole the white patch on its chest appears very clear. From my position, I have a better view of the animal, so raising my gun, I aim at the shoulder and fire, a yell follows, then standing upright it falls over and rolls down the rock. After a little struggle it is still and the first bear is killed. We make our way down and pull it clear of the water hole and out of wind and resume our watching.

About half an hour we had settled down, another unexpectedly appears over the rocks to our right. It seems to have got our wind and is about to make off, but my friend fires and drops it, a good shot indeed. We drag it alongside the other and settle ourselves again. It is not yet midnight and the moon is well up and everything is brightly illuminated, and the slightest movement of the air causes the leaves of the surrounding jungle to shimmer like silver. Suddenly in the still we hear a report as of the snapping of the branch of a tree. After a while something large pushes its way on the left. It is an elephant and it remains stationary at the border of the jungle, evidently to see if "all's well" and satisfied, he slowly approaches the waterhole, with its huge form lit up by the moon. It takes a long drink, pours a little over its body, turns quickly round and disappears. How such a huge brute could move about so silently is wonderful. Suddenly, I discovered a leopard lapping the water, come there as if by magic. It shows a good flank, and afraid that it may disappear as quickly as it came, I aim behind the shoulder and fire. It growls, springs into the air and falls flat on its side; stone dead first shot, —great luck. Still we continue to watch and we hear the mellow call of a sambhur coming closer to us. "Madu man" says out tracker. It advances cautiously and stands before the waterhole like a statue in the moonlight, forming

with its spread of antlers and stateliness, a perfect picture. It has drunk and is off. Our eyes are heavy and setting the tracker to watch we lie down to sleep. Soon however I am startled by a report and rising I am just in time to see a bear shot by my companion rolling down the rock. We sleep again only to be disturbed by our tracker, informing us that it is daylight.

L. E. J.

Coimbatore.

31—10—19.

The Ceylon Ghat Tracer as a height and distance measurer.

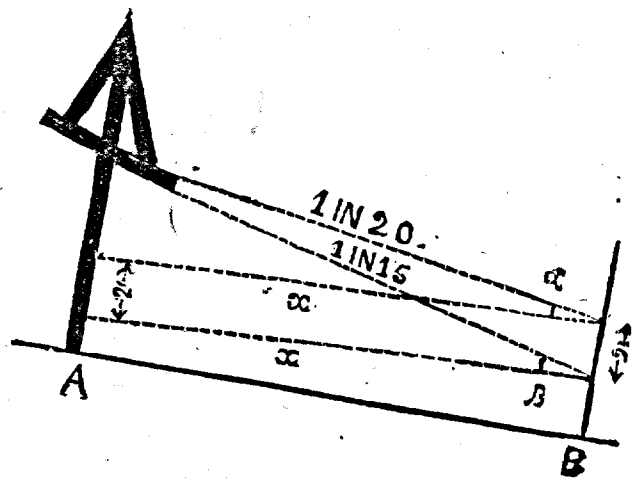
The Ghat tracer hitherto has been used only for levelling purposes, and for obtaining the gradients by direct reading. It can also be adapted for telemetric purposes and for height measurements. The results obtained are not as accurate as those obtained from angular instruments as the theodolite but are sufficiently so for all practical purposes in forest work. Any result however approximate, is of immense value, expecially in preliminary work, and where expedition is of any consideration. Heights and distances may be measured with the ghat tracer correct to within a foot, which is all that can be demanded of an instrument which replaces one with high lens power.

1. To find the distance between two points in tracing a road.

The cross staff usually employed with the ghat tracer requires an extra cross bar fixed to it exactly 2 feet below the existing one. Two readings are also necessary—one to the top bar and one to the bar below it.

With the aid of the following table, distances can be obtained without actual measurement as will be seen from the diagram.

Rule: Divide 200 by the difference between the figures shown against each gradient.



Example: Reading to top vane 1 in 20
„ lower „ 1 in 15
Distance A—B $= \frac{200}{6.67-5.00} = 119.8$ or 120 ft.

The calculation can be proved trignometrically.

$\tan \alpha = \frac{x}{20}$, $\tan \beta = \frac{x}{15}$

$\tan \beta - \tan \alpha = \frac{x}{15} - \frac{x}{20} = 2'$

$\therefore \frac{20x-15x}{300} = 2'$

or $\frac{5x}{300} = 2'$

or $x = \frac{2 \times 300}{5} = 120$ feet.

The above calculation serves also the purpose of checking the accuracy of the ghat tracer. If the ghat tracer does not give the distance as calculated by this method it is inaccurate.

TABLE:

Gradient.	Tabular figure
Level.	0·00
1 in 120	0·83
1 in 90	1·11
1 in 60	1·66
1 in 50	2·00
1 in 45	2·22
1 in 40	2·50
1 in 35	2·86
1 in 30	3·33
1 in 24	4·17
1 in 20	5·00
1 in 18	5·55
1 in 17	5·88
1 in 16	6·25
1 in 15	6·67
1 in 14	7·14
1 in 13	7·69
1 in 12	8·33
1 in 11	9·09
1 in 10	10·00
1 in 9	11·11
1 in 8	12·50
1 in 7	14·28

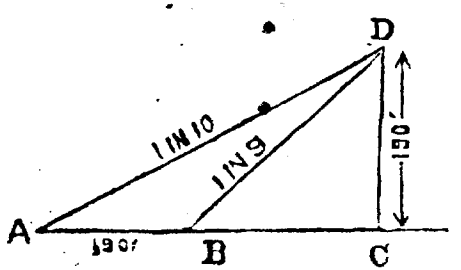
If one of the readings gives a rising gradient, and the other level or, vice versa divide 200 by the rising gradient.

If one of the reading is a rising gradient, and the other a fall-gradient or vice versa divide 200 by the sum of the figures opposite each gradient.

To find the height of a distant object such as a hill peak, saddle or a spur :—

Two readings should be taken from two points in the same straight line with the object.

Measure the distance AB and divide it by the difference between the reciprocals of the gradients.



Example: Gradient at A = 1 in 10
„ at B = 1 in 9
Distance A B = 190
Height C D $= \frac{190}{10-9} =$ 190 ft.

If the ghat tracer can be graduated to read gradients as steep as 1 in 1, heights of trees may also be obtained.

3. To find the breadth of a river :—

Read the gradient from the water line along one bank to a point in the water line along the opposite bank at right angles to the stream

(without the cross staff). Measure the height of instrument or of the cross staff, and multiply it by the gradient for the breadth.

Example: Gradient to edge of water ... 1 in 40
Height of instrument ... 5 ft.
Breadth of river ... 5 × 40 = 200 ft.

R. E. LEMOS,
Forest Ranger, Ambasamudram.

[The article is suggestive as showing that the ghaut tracer in the hands of a clever man, can be put to more uses than merely tracing roads. There are one or two inaccuracies, however, in the article, and it can also be improved in other respects. For instance, it is stated that tan $\alpha = \frac{X}{20}$ where X is the distance required, which is obviously incorrect. Similarly tan β is not $\frac{X}{15}$; but tan $\alpha = \frac{1}{20}$ and $\tan \beta = \frac{1}{15}$ and tan β − tan $\alpha = \frac{1}{15} - \frac{1}{20} = \frac{2}{X} \therefore X = 120$. Besides, the use of the table is cumbersome, and quite unnecessary as it involves dividing 200, by a decimal fraction etc. The result could be obtained more accurately, and more simply in the manner shown above. Vide the calculation underlined. As the ghaut tracer is not provided with any lens, its range for distances is extremely limited. For short distances, it is quite good.—ABDUL KARIM.]

Madras Forest College Athletic Sports.

The Annual Athletic Sports were held on the afternoon of the 18th September. Their Excellencies Lord and Lady Willingdon were present, and there was a record attendance.

The arrangements were excellent; unfortunately a heavy shower of rain at noon had made the track rather heavy, but in spite

of this three College records were broken, namely, the High Jump, the 100 yards Race for past students, and the Mile.

J. A. Muliyil one of the best athletes in residence, had been keeping very poor health, and so was unable to do himself justice. He did a very graceful High Jump of 4 ft. 11¼ inches, without much effort, and with absolutely no practice.

In the "Hurdles", Muliyil had very bad luck. He was leading by ten yards at the last Jump, but unfortunately missed his stride, fouled the hurdle, fell, and had not sufficient strength to scramble in fast enough, and was beaten by inches by L. E. Juriansz. The lion's share of the prizes went to M. B. Subbiah and Juriansz. The latter won the "Richmond Cup" with 20 points; while M. B. Subbiah who was just one point behind for the championship, collared most of the plums, such as "The Moopil Nair Cup", the Principal's prize, and the Vice-President's Cup.

The Sack Mêlée and "Log Cutting" were keenly contested events, and afforded good sport to the spectators. Her Excellency Lady Willingdon very kindly presented a prize for the "Log Cutting", which was won quite easily by D. Venkateswarulu.

The last event was the Willingdon Mêlée.—a Sack fight between the Forest Department and the World. The World was large and heavy, but happily enough the Forest Department won.

At the conclusion of the Sports the Principal delivered an appropriate and delightfully humorous speech, to which His Excellency replied.

Her Excellency then presented the prizes. The following is a list of the prize winners:—

100 yards Flat Race.

1. L. E. Juriansz. 11 2/5 seconds.
2. M. B. Subbiah.
3. J. A. Muliyil.

Long Jump.

1. J. A. Muliyil. 16 ft. 11 inches.
2. M. B. Subbiah.
3. L. E. Juriansz.

100 yards Race — Past Students.

1. C. S. Nanjappa. 12 seconds.
2. T. D. Ponniah.

High Jump.

1. J. A. Muliyil. 4 ft. 11¼ inches.
2. Abdul Rahim Khan.
3. L. E. Juriansz.

Throwing the Cricket Ball.

1. L. E. Juriansz. 84½ yards.
2. M. P. Subbiah

120 yards Hurdle Race.

1. L. E. Juriansz. 20 seconds.
2. J. A. Muliyil.

Slow Cycle Race.

1. K. Appa Rau.
2. Abdul Rahiman.

440 yards Race.

1. M. B. Subbiah. 60 seconds.
2. L. E. Juriansz.
3. K. Appiah.

Invitation Half Mile Race.

1. Jesudian. L. M. H. School. 2 mins. 28 seconds.
2. Kesavelu. L. M. H. S.

Half Mile Race.

1. M. B. Subbiah. 2 mins. 30 seconds.
2. K. G. Monappa.
3. V. Narayanasamy Ayyar.

Sack scrimmage.

Narayanasamy Ayyar.
Abdul Rahiman.
Theodore.
Karumbayya.
Nageswara Ayyar.

One Mile Race.

1. M. B. Subbiah. 5 mins. 32 seconds.
2. V. Narayanasamy Ayyar.
3. L. E. Juriansz.

Log Cutting.

1. D. Venkateswarulu.
2. M. P. Subbiah.

Willingdon, Mêlée.

The Forest Department beat the World.

The Inter divisional Hockey Match for the Cowley-Brown Cup.

The game was played on the College grounds on the 9th October 1919. It was a pleasant evening with a light wind which

wafted the M. F. C. flag on the newly erected flag-staff in the Athletic grounds.

Mr. Longrigg was umpire The match was played with much keenness on either side; the Seniors being very anxious to retain the cup which they had won in the previous year; and Juniors to wrest it from the Seniors.

Individually every player did his best; but there was good combination amongst the Seniors who exhibited cleverness in the manner in which they passed the ball. Among the Juniors there were some good individual players, but the team lacked combination; and the result of which was that they lost by 14 goals to nil.

This is the second time in the annals of the College that the Seniors have retained the cup won by them in the privious year.

The Principal, the donor of the cup, Mrs. Cowley-Brown, Mr. Cornwell etc. were intersted spectators.

After the termination of the game the Principal made a short impressive and instructive speech pointing out the objects with which the cup was presented, and how want of combination would result in a defeat. He observed that the cup was instituted not only for encouraging the game but also to create amongst the students a feeling of brotherhood and determination.

G. Appa Rao,
Secretary
Athletic Club, M. F .C.

Results of matches played by the Madras Forest College during August, September and October 1919.

HOCKEY.

Date.	Versus.	Result.	Goals.	
			For	Against
14th August.	London Mission High School ...	Won.	10	1
19th August.	Agricultural College ...	Won.	3	1
26th August.	Agricultural College ...	Lost.	3	1
2nd Sept.	Central Recruits School.	Won.	12	Nil.
9th Sept.	Reserve Police ...	Interrupted by rain; three to one in our favour.		
23rd Sept.	Reserve Police ...	Play interrupted by rain.		
30th Sept.	Reserve Police ...	Draw four all.		
7th October.	Young Men's United ...	Won.	4	2
14th October.	Young Men's United ...	Won.	5	2

Coimbatore Hockey Tournament.

—o—

27th October.	Stanes High School ...	Won.	3	1
28th October.	Reserve Police ...	Won.	4	1
29th October.	Agricultural College ...	Won.	3	Nil.
		Total...	47	9

CRICKET.

Date.	Versus.	Result.
31st Aug. 19.	Agricultural College.	Lost 5 runs.
5th Oct. 19.	Coimbatore United Club.	Lost 30 to 99 runs.
12th Oct. 19.	Coimbatore United Club.	Won by 132 to 116 runs.

G. Appa Rao,
Secretary,
Athletic Club, M. F. C.

Occasional Notes.

The Stanes Hockey Tournament owes its foundation to the generosity of Mr. Robert Stanes, who in 1915 presented a silver

Challenge Cup to be competed for annually by recognised Clubs and Colleges in Coimbatore. On October 29th it was won for the first time by the Madras Forest College. Last year we were in the Finals and probably had the best team in the competitions, but owing to lack of leadership, and to several casualties in the final game, our combination deteriorated, and contrary to public expectation we succumbed to the Reserve Police team. This year we have had the great advantage of Mr. Cornwell's skilled coaching and expert play, while the front line was further strengthened by Mr. Longrigg's dash and scoring ability. We perhaps had just as good a team individually last year — but the stiffening and controlling element was lacking.

K. Appayya our captain this year has shown himself to be thoroughly reliable in defence, and has been ably supported by M. P. Subbayya, Monappa, M. B. Subbayya, and Havildar Kadir Batcha. K. Appayya is to be congratulated on his successful season fittingly terminated by his victory in the Stanes Tournament, for which eight teams entered. In the first ties the College defeated Stanes High School, in the semifinals the Reserve Police, and in the Finals the Agricultural College. The Agricultural College had the misfortune to be without the services of their coach and leader Dr. Norris. As regards Casualties from the play, the luck was about the same on both sides. In the Finals, the Forest College played rather below its form. The games played in a clean and healthy spirit, were to the on-lookers an edifying example—may this same atmosphere prove infectious in Coimbatore.

The Central Police Recruits School has furnished excellent grounds, and the referees were observant, prompt and firm.

If the present conditions, and spirit continue, the prosperity of Coimbatore Hockey in general and of the Madras Forest College in particular is assured.

* * *

On the recommendation of the Vice-President, Athletic Club Hockey Colours have been awarded to student Juriansz.

* * *

G. Appa Rao has been selected as Secretary of the Athletic Club.

* * *

The following colours for Athletics have been awarded :—

L. E. Juriansz	20 marks.
M. B. Subbiah	19 ,,
J. A. Muliyil,	13 ,,

* * *

Under Appendix I Athletic Club Rules, upon the report of the Vice-President, Athletic Club, student Juriansz is awarded his colours for Athletics.

* * *

The Principal accepts with many thanks the generous offer of enior Student S. Nagalingam Pillai to present his War Bond for s. 100 to the Students' Club Fund. Student Nagalingam Pillai ill be shown on the Tablets of the Club as a Patron.

Ranger Mr. Nicholas (1912—14) has generously contributed Rs. 100 towards the Students' Club. He thereby becomes a Patron.

* * *

Mr. T. D. Ponniah (1917—19) has generously contributed Rs. 100 in War Bond to the Students' Club.

* * *

A yale triplex differential hoist, and a bamboo fire station have been added to the Engineering park apparatus.

* * *

The first examination of the Students' gardens was held on the 31st October. Considering the short time that the gardens have been started (about 10 weeks), the unfavourable weather, and the many calls on Students' leisure during the first Head Quarter term of the year, the display in most cases was very creditable.

Students are recommended to confine their efforts chiefly to edgings, Cannas, quick growing trees, such as Terminalia Catappa and ornamental crotons, as the special conditions of students' gardening are unfavourable to the cultivation of flowers. The designs were in many cases ingenious and successful. Student Abyankar is to be commended for his maze and puzzles, student M. B. Subbayya for his clock, and student Monappa for his Union Jack.

On the trellis of the Hostels perennial and not annual creepers should be cultivated.

The highest marks for creepers were awarded to Block V and for individual gardens to students K. G. Monappa, and M B Subbayya.

During the touring terms the gardens will be maintained as far as possible in their present condition.

The next examination will be held at the beginning of April.

* * *

A village council for the servants' colony has been established.

A Night School is in process of formation.

* * *

At the November Examination of the Servants' gardens the following were the awards:—

1st Prize.	Forest guard. (Kistnan).
2nd Prize.	Mali Ramaswami.
3rd Prize.	Abdul.
4th Prize.	Mali Arumugam.
Highly commended	Hayildar Kadir Batcha.

Sweepers' gardens:—

1st Prize.	Raman.

Head Mali Arjunan was given a pecuniary reward for detecting by means of an ambush a culprit in the act of stealing wire, and standards from the College boundary. The accused was sentenced to 6 months' rigorous imprisonment.

We understand that Mr. Swamikutti (1914—16. Madras Ranger Higher) has set an excellent example in Malabar District by organising and carrying out the sale of food grain to the indigent inhabitants of Nilambur &c., at greatly reduced prices.

The effort is all the more creditable to Mr. Swamikutti, as he is in charge of one of the heaviest Ranges in India.

* * *

A limited quantity of the new Blazer Flannel is available at the College at Rs. 6—7—0 per yard 54" wide.

Two yards or less should suffice for a Blazer.

Old students requiring flannel for Blazers may apply to the Principal.

Messrs. Hussain Khan, Tailors, South Parade, Bangalore will put the ordinary monogram on the pocket for Rs. 1-8-0,—Rs. 1-12-0, and "colours" monogram for Rs. 6—4—0 (12 annas per letter being charged in addition).

* * *

The receipt of 4 teak seedlings and some ferns sent by Mr. Nicholas Range Officer Thunakadavu is acknowledged with thanks

We have to record with deep regret the death of Senio student A. Srinivasachari from Pneumonia at noon on the 8th September. We offer our sympathy to the bereaved relatives.

He was admitted on 10-8-1919 to the Government Hospital Coimbatore as an Influenza patient. For the last 10 days, he had been practically convalescent. The Principal, House Tutor and some of the students frequently went to see him in Hospital. His temperature on the morning of the 8th was normal, and he had been reading that morning. It was expected that he would return to the College within a day or two. The Medical Officer was of opinion that Secondary Pneumonia intervened suddenly; he also suspected Tuberculosis. The student died quite suddenly.

The funeral was largely attended by members of the College.

This student was intellectually far above the average.

* * *

The College is indebted for the receipt of :—

2 young quails.
4 big partridges
5 young partridges,
& 4 peacocks.

} from M. R. Ry. B. S. Ramaswami Ayyar, R. O. Bhavani.

24 Teak seedlings from M. R. Ry. E. V. Padmanaba Pillai avl. D. F. O. Central Coimbatore;

4 Teak seedlings, and ferns from Mr. A. Nicholas, R. O. Mt. Stuart; about 1000 plants of *Euphorbia heterophylla*, from the Agricultural College garden, Coimbatore; and seeds from many D.F.O.'s.

Students' Club Fund.

STATEMENT SHOWING AMOUNT STILL DUE FROM PAST STUDENTS.

NAME OF DONOR.	AMOUNT STILL DUE. Rs.	AS.	PS.
Mr. C. S. Ramanathan	10	14	0
„ M. R. Doraiswami	3	0	0
„ P. A. Krishnaswami Mudaliar ...	5	0	0
„ Kerala Varma	10	0	0
„ S. Ramachandra Ayyar	5	0	0
„ S. Chinna Dorai	80	0	0
„ C. M. Kunhiraman Nair	5	0	0
„ Gulam Dastagiri	9	0	0
„ D. E. Lewin	9	0	0
„ S. A. Dawson	11	0	0
„ K. Thiruvenkata Achari	13	0	0
„ C. Karunakara Menon	9	0	0
„ N. T. Thambi	9	0	0
„ P. Karunakara Menon	9	0	0
„ T. Paramasivam Pillai	9	0	0
„ P. Dhananjaya Rao	13	0	0
„ Kesava Pillai	12	0	0
„ I. Ramalingam	8	0	0
„ Rama Rao Kini	8	0	0
„ L. A. Krishna Iyer	7	0	0
„ P. M. Mathew	5	0	0
„ K. S. Raghavachari	3	0	0
„ Kunhi Royan Sahib	7	8	0
„ S. Krishna Ayyangar	15	0	0

NAME OF DONOR.	AMOUNT STILL DUE. Rs	AS.	PS.
„ Syed Manavar	15	0	0
„ T. K. Parameswaram Pillai ...	15	0	0
„ P. Krishnan	10	0	0
„ T. E. Varadachari	15	0	0
„ K. Ramachandra Iyer	10	0	0
„ K. G. Sundararaja Rao	10	0	0
„ K. G. Sreenivasa Rao	10	0	0
„ M. Krishna Iyer	10	0	0
„ C. T. Thiruvenkadam	10	0	0
„ S. V Sibghatullahi	10	0	0
„ Gulam Russool	10	0	0
„ T. R. Naganathan	10	0	0
„ T. S. Narayanaswami Chetty ...	10	0	0
„ W. Balakrishna Mudaliar... ...	10	0	0
„ Aiyappa Asari	15	0	0
„ D. Patel	18	0	0
„ K. Jayaramam	12	0	0
„ Narasinga Rao	10	0	0
„ A. Subramania Ayyar	10	0	0
„ T. Balaramaswami	10	0	0
„ V. Mahadeva Ayyar	16	0	0
„ P. V. Ramana Rao	12	0	0
„ R. E. Lemos	50	0	0
„ V. Raman Pillai	10	0	0
„ B. V. Nagaraja Iyer	10	0	0
„ Thammayya	5	0	0
„ P. Miranda	5	0	0
„ T. T. Ansep	10	0	0

The following further contributions have been made to the Students' club :—

	Rs.	AS.	PS.
Mr. J. S. Rowland, M. R. Hons (1916—18 Du.)	45	0	0
„ A. B. Fenn M. R. H.	10	0	0
„ A. Swamikutty M. R. H. ...	45	0	0

Miscellanea.

Fighting forest fires from the skies.

We extract the following from the Scientific American for August 2, 1919 :—

"The chance to furnish invaluable military training for aviators and at the same time to perform a useful peacetime service is now offered in our great Western timber preserves. The annual loss by fire in our forests is enormous, despite the precautions taken to discover the fires as soon as they start and put them out before they can get under head-way. There are patrols on foot and on horse-back, and also on motor-cycles which are constantly travelling over the forest lands ready to put out a blaze when it appears. Lookouts are stationed at high points to watch for smoke, but the vision of those lookouts is necessarily limited. The regions are vast and hence it is impossible to cover them thoroughly, so that fires frequently get a head start and reach serious proportions before the fire fighters can reach them.

In order to enlarge the field of observation balloons are now being used for lookout posts and these rising high above the forest

given an excellent view of surroundings for scores of miles in all directions. They are in telephonic communication with fire stations so that they can report a fire at once and send the fire fighters to the scene.

But the balloons do not provide complete protection and so observation airplanes are now being used. These travel at a considerable elevation and can circle over a very wide area. They can travel as far in an hour as a patrol could travel in three or four days. When a fire is discovered the fact is signalled to the nearest station. In some cases a message is dropped by parachute. The latest development is to equip the machines with wireless outfits so that they can telegraph their discoveries immediately. The airplane forest scouts keep in excellent practice and should prove useful in time of war.

Time is the most important element in this work and even though airplanes are speedy and can make their report instantly by wireless to the nearest stations it takes time for the men to reach the scene of the fire. What is needed is some first aid treatment to check the fire until the real fire fighting forces can arrive. It has been proposed, therefore, that bombing planes be used, fitted with bombs containing gases that smother fire. The fires then can be fought just as the Huns were fought by means of gas attacks. Carbon-di-oxide or some other gas dropped on the fire will smother it, and if the blaze is discovered in its early stages a few bombs may quench it completely. At any rate a fight can be started on the fire as soon as it is discovered, instead of waiting a long time for the fire fighters on the ground to reach the spot."

Fixing of green colour in plants.

The method of fixing the green colour in plants described in the "Kew Bulletin" so long ago as 1908 deserves to be more widely known than it seems to be among those interested in preparing plant specimens for exhibition in museums, or for lecture purposes. By placing the plant for a shorter or longer period in a boiling solution of Copper acetate dissolved in acetic acid, a combination of the copper salt with the chlorophyll is formed which serves to render the colour permanent when the specimen is exposed to the light after drying, or placed in a preservative solution such as alcohol. Different plants lend themselves to the treatment with different degrees of success, and require very different periods of treatment; the time for which it is necessary to keep the plant in the boiling solution varies from 1 minute to 40 minutes, according to the action of the copper salt on the plant. If the action is proceeding satisfactorily a period of 1 to 5 minutes will suffice; the end of the operation is easily judged by the colour, or by treating two different specimens for different periods; a specimen that by such comparison appears to require longer treatment can always be re-immersed to get the desired effect.

Many plants, notably the leaves of evergreen shrubs are more difficult, and generally less satisfactory in the ultimate colour, probably owing to the presence of mucilaginous, or, decomposing, products, tannins. These require long treatment varying from 20—40 minutes after the first immersion they turn yellowish, and then, after some time the yellow gradually gives place to green, generally an olive green.

After treatment the plants should be washed (like photographic prints) in running water for about two hours. They are then dried under as light pressure as is compatible with keeping the plants free

twisting, or, after shaking off as much water as possible, may be dried in hot sand. In many cases the plants are rendered so flaccid by boiling, that sand drying is difficult or impossible.

Young parts of plants green better than old; better results may be expected from spring leaves than from autumn leaves.

A stock solution is made by saturating commercial strong acetic acid with powdered copper acetate. For treatment dilute the stock solution with water in the proportion of 3 or 4 parts of water to one of stock solution. The solution is heated in a non-metallic vessel, glass beakers being probably the most suitable, and wooden non-metal forceps should be used for manipulating the specimens. Extract from "Scientific American"

* * *

The daily water consumption in New York is 600,000,000 gallons: (Scientific American): the Madras Forest College requires 1,000 gallons per day for its full development; it actually gets from the P. W. cistern at present about 4,800 gallons per day.

* * * *

Oxygen requirements of roots.

Messrs. B. E. Livingstone and E. E. Free have reported a number of observations indicating that the *aeration* of the soil is a much more important factor in plant ecology than has hitherto been suspected. They have found, for example, that Heliotrope and *Coleus* require the maintenance of a certain oxygen-content in the air of the soil about their roots in order to thrive. The roots of Oleander, on the other hand,

appear to require much less oxygen than the plants above named, and the injury produced by entire deprivation of oxygen is much less quickly developed. The roots of swamp willow appear to be unaffected by a lack of oxygen; they grew normally for periods as long as ten weeks with no oxygen in the soil.

(SCIENTIFIC AMERICAN.)
April 14th 1917.

* * *

Extract from a letter from a Coorg old student to an Instructor.

"I was one of those pessimists who while at the College always thought that most or at least some of the things in Engineering taught at the College are useless, or at least can never be made use of in our practical life. I am very sorry I made a great mistake.

Every word you uttered in the lecture rooms is found useful to me now.

I laid out the profile of the tram road culverts, and dry earth slides and a 200′ radius curve all strict in accordance with instruction I received at the College and this was not passed without being recognised by the Engineer Mr. R. D. Smither under whom I am working.

* * * *

The following evidence by Mr. P. M Lushington before the Industria Commission is of interest :—

Q. How is it that Government embarked on Malabar teak plantations? Was there a properly constituted Forest Department for teak plantations?

A. No. It was a matter of chance. The way it was started was this. There was a needy temple which was very much in debt and they wanted to do something to help it so as to keep it out of debt and the only course was to take these forests on lease and give a certain amount of money down. When the land was handed over, a shrewd Collecter started the teak plantation which was subsequently handed over to the Forest Department.

Q. Considering the expenditure that was incurred on the development of that plantation, has it turned out so far to be a commercial proposition?

A. Magnificiently.

* * *

Extract from the Planters' Chronicle dated 20th September 1919.

"The following easy calculation for finding the approximate amount of water in a well or water hole may be useful to some of your planter readers of your valuable journal :—

1. Measure the diameter of the well at the top.
2. Square it, and knock off the last figure.
3. Divide the result by 3.
4. The result will be the number of gallons per foot of water in the well.
5. Find the depth of the water by means of a stick.
6. Multiply the last result and you will have the number of gallons of water in the well.

Example:—

1. Say, diameter of well. 5 ft. or 60 inches.

2.	60 × 60.	3600.
3 & 4.	360 ÷ 3.	120 gallons per foot of water.
5.	Depth of water.	10 ft.
6.	120 × 10.	1200 gallons of water."

* * *

Potash from Banana stalks and skins: One of the many plants recently suggested as a source of potash is the banana. A ton of stalks yields 188 pounds of dry matter, containing 13·7 % of potash. An examination of banana skins showed a total potash content of 1·05 % the dry matter containing 9·05 % potash.

"Scientific American"
June 9th 1917.

* * *

Duration of leaves in Evergreens: Leaf duration varies widely both among different species and among individuals of the same species. The shortest duration is found in *Rhamnus purshiana* - a quasi-deciduous plant. The longest duration is noted in *Taxus brevifolia* in which some leaves have persisted for *23 years* through the average is from 5 to 12 years. Saplings of evergreen trees have a shorter leaf duration than mature trees in the same habitat. Trees and shrubs growing in the open have a shorter leaf duration than those of similar age in the shade.

Scientific American.
April 28th 1917.

*

Among the plants found most sensitive to soil acidity are Asparagus, barley, beets, celery, leek, lettuce, onions, clover, spinach, and tobacco.

Paper from spinach. A French horticulturist proposes the stems of Spinach for making paper. (These contain 46% of cellulose against 6% in the stems of wheat straw) According to him, the quality of the paper produced is as good as the best Japanese one.

"Scientific American."

* * *

List of books received for the General Library for the Quarter ending 30th September 1919.

1. Working Plan for the Naini Tal Forest Dn. Kumaon Circle United Provinces.
2. Eminent Victorians.
3. Fourth Dimension simply explained ; By Manning.
4. Report on Forest Management in Germany, Austria and Great Britain ; By C. Campbell Walker.
5. Supplement to reports on Forest Management in France, Switzerland & Lower Austria ; by Lt. C. G. Pearson.
6. Notes on Forestry ; by C. F. Amery. 1875.
7. Mensuration of timber & timber Crops ; by P. J. Carter.
8. Report on the working of Casuarina Plantations in the Nellore Dist. since 1899-1900 ; by E. R. Murray.
9. Report on the measurement of rates of growth of Casuarina in the Nellore District.
10. Circulars of the Consr. of Forests Central Circle 1898 to 1908.
11. Code of criminal procedure 1882 (Act No. X of 1882).
12. Ready reckoner ; by M. C. Guha.
13. Malaria In the Punjab ; by Lt. Cl. G. F. N. Braide I. M. S.
14. Administration report of Madras Presidency 1877—78.

15. Extract from the Forest Code relating to the maintenance of Depôt accounts.
16. Appendix 1. Working Plan of the Sholakarai Block; by Campbell Walker, Lt. Col.
17. General Catalogue of exhibits forwarded to Culcutta for the London Exhibition.
18. General Catalogue of exhibits forwarded for the International Forestry Exhibition, Edinburgh.
19. The Date Palm in India; by E. Bouânia, M. D.
20. Forests; A pamphlet by Lt Cl. G. J. Von Someron.
21. A supplement of Drury's useful plants of India 1884.
22. Dr. Bouania's Date Palm in India. (Tamil Book).
23. Text book of the diseases of trees; by Professor R. Hartig.
24. Timbers, and How to know them.
25. Forest Law; by Baden Powell.
26. Lectures on the Physiology of plants; by Julius Von Sachs.
27. Elementary lessons in Physical Geography; by Sir. Archibald Geikie.
28. Spineless Cactus.
29. Forestry in South India; by Morgan.
30. Analytical key to the Animal Kingdom; by B. B. Oosmaston F. C. S.
31. Origin of Species; by C. Darwin.
32. Fancy waterfowl; by; Frank Finn.
33. How to know Indian Ducks; by Frank Finn.
34. How to know Indian waders; by Frank Finn.
35. The birds of Calcutta; by Frank Finn.
36. The practice of Forestry; by C. J. Michie.
37. Botany; The modern study of Plants; by Marie Stopes.
38. Flowers, Fruits and leaves; by Sir John Lubbock.
39. Gardening; A Guide for Amateurs in India; W. W. Johnston.

40. Suggestions for future Forest Colleges; by F. L. C. Cowley-Brown Esqr.
41. Govt. Security Manual; 1919.
42. Indian Munition Board Hand book.
43. Manual of Standing orders for Forest Subordinates, Rangoon, 1919.
44. Addenda, and Corrigenda. Slip No. 14. Supplement for the Gorakhpur Working Plan, Eastern Circle, Uuited Provinces
45. Indian Forest Records; Vol. 7, part 2, by F. A. Wright.
46. Report of the woods and Forest Department for the ½ year ending 30—6—19, for Western Australia.
47. Note on a tour of inspection in some of the Forests of the Madras Presidency; by G. S. Hart C. I. E.
48. Notes on Forest Policy; by F. A. Lodge Esqr. C. I. E.
49. Working Plan for the Mount Stuart Forests; S. Coimbatore Dn.; by H. F. A. Wood.
50. Commercial Forestry in Britain; by E. P. Stebbing.
51. British Forestry; by E. P. Stebbing.
52. Cleghorn's "Forests and gardens of South India" 1861.
53. The Times History of the War; presented by Mrs. Cowley-Brown.

Contributions to the Gass Museum.

Serial No.	Contribution.	Contributor.
1	Two models of elephants.	Mr. A. Swamikutty M. R. H. R. O. Nilambur.
2	A Queen ant.	M. P. Phillip M. F. C. Student 1919-21 Division

Serial No.	Contribution.	Contributor.
3	A framed photograph of Halley's Comet.	M. R. Ry. C. P. Garudachala Mudaliar, R. O. Pollachi.
4	Loan of :- (a) Two mounted panther skins. (b) Two unmounted panther skins. (c) One Mounted tiger skin.	The Hon'ble Mr. H. G Stokes, C. I. E., I. C. S.
5	8 oz. of Sandal oil.	M. R. Ry. A. R Narasimha Ayyangar Avl. D. F. O. N. Mangalore.
6	One specimen of Vegetable pathology.	H. A. Latham Esq.
7	26 Bark samples.	M. R. Ry. E. K. Krishnan Avl D. F. O. N. Vellore.
8	66 Photographs.	Imperial Forest College Dehr Dun.
9	Three photographs.	S. Nagalingam Pillai Studen M. F. C. 1918—20, Dn.
10	Larva of a Bostrochid.	M. R. Ry. G. N. Subba Rao B.A., R. O. Attur Range.
11	Sample of Satin spar.	R. B. Cornwell Esq. E. A. C.
12	Two long panels Two short „ Four blocks	M. R. Ry. B. S. Ramasami Ayyar R. O. Bhavani.

Advertisements.

The following numbers of the 'Indian Forester' are required for the *Students'* Library, The Principal will be glad to receive any that officers can spare:—

1. Volume 1, 2 and 3 for 1875—76, 1876—77, and 1877—78.
2. Volume 6 for 1880—81.
3. Volume 13 for 1887—February Number.
4. Volume 14 for 1888—January, February, March, April and December numbers.
5. Volume 15, 16, for 1889, and 1890.
6. Volume 17 for 1891—August, September, October and Novem, ber numbers.
7. Volume 18 for 1892.
8. Volume 19 for 1893—February number.
9. Volume 20 for 1894—January, February, March, July and August numbers.
10. Volume 21 for 1895.
11. Volume 24 for 1898—March and April numbers.
12. Volume 25 for 1899—April, May, June and August to December number.
13. Volume 26 for 1900—August number.
14. Volume 34 for the year 1908—July number.
15. Volume 36 for the year 1910—August number.
16. Volume 38 for the year 1912—January, March, October and December Nos.
17. Volume 39 for the year 1913—January, April, September and October Nos.
18. Volume 40 for the year 1914—June number.

19. Volume 41 for the year 1915—April and September numbers.

20. Volume 42 for the year 1916—May, June, November and December numbers.

21. Volume 43 for the year 1917—January, February, April, November and December numbers.

WANTED.

A copy in good condition of "Hume and Marshall's Ducks" with coloured plates intact. Apply stating price to the:—

PRINCIPAL, MADRAS FOREST COLLEGE,
Coimbatore, Lawley Road, P. O.

WANTED.

For the Library a copy (mounted if possible) of the June 1916 College Group.

Rs. 2—4—0 will be paid for it.

Madras Forest College,
Coimbatore.

F. L. C. COWLEY-BROWN,
Principal.

Gazette Notifications.

2ND SEPTEMBER 1919.

M. R. Ry. S. Srinivasa Rao in charge of Attapadi range, Central Coimbatore, is dismissed from Government Service, and all pay and allowances now due to him are forfeited to Government.

M. R. Ry. A. P. Srinivasa Ayyangar granted privilege for 3 months from 29th June 1919, is recalled to duty, and posted to Mangalore range, N. Mangalore division—to join at once.

M. R. Ry M. N. Raman pillai, Mangalore range, is on relief, transferred to Attapadi Range, C. Coimbatore division.

9TH SEPTEMBER 1919.

Mr. F. X. Mascarenhas, Special Veterinary Inspector of the Forest Department, privilege leave for 1 month and 27 days. M. R. Ry. S. V. Devadoss Pillai special Veterinary Assistant Inspector of the Forest Department to act as special Veterinary Inspector, during the absence of Mr. F. X. Mascarenhas. The two months' privilege leave granted to R. O. M. R. Ry. S. Chidambara Ayyar is extended by one month

16TH SEPTEMBER 1919.

Mr. C. C. Wilson, Dy. Conservator, Combined privilege leave and furlough for 7 months from date of relief.

Mr. A. A. F. Minchin, D. F. O Ganjam, privilege leave for 1 month. M. R. Ry. V. Narayana Ayyar Avergal, E. A. C. *Sub-pro-tem* will act as D. F. O. Ganjam.

M. R. Ry. C. Ramaswami Naidu, R. O. II grade, privilege leave for 2 months from date of relief.

B. T. Sitarama Ayyar, Dy. Ranger I grade to be Ranger VI grade, *Sub-pro-tem*.

K. Parthasarathy Ayyangar Dy. Ranger II grade to act as Ranger VI grade *Vice* M. R. Ry. C. Rajagopaul Naidu, on leave.

The following postings and transfers are ordered :—

(1). M. R. Ry. K. Kunhiroyan Sahib, R. O. to charge of Mettupalayam Range, Central Coimbatore.

(2). M. R. Ry. N. Gopalan Nayar, Dy. Ranger II grade, and Ag. R. O. VI grade, to charge of Begur Range, North Malabar.

(3). M. R. Ry. C. Vasu, R. O. VI grade to charge of Timber duty Nilambur.

M. R. Ry. K. R Krishnan Nair, R. O. IV grade, on return from leave, is posted to S. Coimbatore Division, on special duty.

28TH OCTOBER 1919.

Mr. T. Clear, Dy. Consr. of Forests, Combined privilege leave, and furlough, on medical certificate, for one year, with effect from the date on which he handed over charge of his duties as D. F. O. Tinnevelly.

The Right Honourable the Secretary of State for India has granted to Mr. J. S Scot Dy. Consr., an extension of leave on medical certificate for three months from 1st November 1919

4TH NOVEMBER 1919.

Mr. F. A. Seager, E. D. C., extension of privilege leave for one month.

Mr. E. M. Crothers, E. D. C., *sub-protem*, extension of privilege leave for two months.

M. R. Ry. E. B. Ramachandra Rao avl. is confirmed as Extra Assistant Conservator.

The privilege leave granted to M. R. Ry. S. Chidambara Ayyar, R. O. S. Cuddapah district, is extended by one month.

M. R. Ry. N. Chakrapani Ayyangar, R. O. VII grade attached to Kurnool South, is transferred to Vizagapatam.

M. R. Ry. C. G. Ganapathi, on leave, is transferred to Kurnool South, for Giddalore range, *vice* Ranger, A. Subramania Ayyar, temporarily reduced.

11TH NOVEMBER 1919.

Mr. T. A. Whitehead, D. F. O. W. Kurnool, to be in charge of S. Kurnool division in addition to his own duties, vice Mr. G. W. Thompson permitted to retire from service.

Mr. V. N. Seshagiri Rao, probationary E. A. C. attached to the Nellore district is transferred temporarily to Chittoor to assist the D. F. O. who is ill.

Mr. S. Shanmuga Kumaran Pillai, Ranger, III grade, from Madura to N. Vellore for the charge of Gudiyattam range.

The combined leave for one year, eight months and 13 days granted to Mr. K. B. Krishnan Nair, Ranger IV grade is further extended by 25 days.

18TH NOVEMBER 1919.

M. R. Ry. T. V. Venkateswara Ayyar Avl., probationery E. A. C., privilege leave for one month, and eight days, and leave on Medical certificate for thirteen days, in continuation thereof with effect from 11th June 1919.

M. R. Ry. K. M. Gopalachari, Ranger IV grade *sub-protem* on return from leave is posted to Guntur district to work under the orders of the D. F. O. Guntur.

M. R. Ry. K. S. Ramiah, Ranger V grade, granted leave on Medical Certificate for one month and 17 days from 4th October 1919.

M. R Ry. K. R. Krishnan Nayar Ranger IV grade is posted for Special duty under the Forest Research Officer, Coimbatore.

The following Foresters are promoted to act as Rangers, VII grade (on Rs. 60) *sub-protem* with effect from 1st October 1919.

1 N. Gopalan Nayar, Forester, II grade.
2. C. S. Jesudasan, ,, I
3. K. Chaikku, ,, I
4. R. Srinivasa Rao, ,, I

25TH NOVEMBER 1919.

M. R. Ry. S. Shanmugakumaran Pillai is posted to the Salem West range, North Salem division.

M. R. Ry. T. D. Rajabadar Mudaliyar, Ranger VII grade, is posted to the charge of Thammampatti range, S. Salem division.

M. R. Ry. C. M. Narayanan, R. O. III grade, Kollegal, privilege leave for 3 months.

P. Sankuni Menon, Dy. Ranger I grade and Ag. Ranger VI grade is transfered to Central Coimbatore, for special duty in Chenat Nair R. F. to join on relief.

23RD SEPTEMBER 1919.

M. R. Ry. P. Govinda Menon Avergal, Pro. E. A. C. privilege leave for Six weeks with effect from 12—8—19.

Promotions and Confirmations :—

1. Y. Pedda Lakshmayya Naidu, Dy. ranger, II Grade to act as Ranger VI Grade, *sub-pro-tem.*

2. M. Umapathi Mudaliar, Dy. ranger II Gr. to act as ranger VI Grade, *sub-pro-tem.*

3. A. K. Joseph, Dy. ranger, II Grade to act as ranger VI Grade.

4. M. Subba Rao, Dy. ranger II Grade to act as ranger VI Grade.

5. Behara Bhagirathi, Dy. ranger II Grade to act as ranger VI Grade.

6. Y. Venkataswami Naidu, Dy. ranger II Grade to act as ranger VI Grade.

Promotions No. 1-3 will take effect from date of taking charge of the ranges to which they are posted on return from Madras Forest College.

30TH SEPTEMBER 1919.

M. R. Ry. M. Subroil Naidu, R. O. III Grade is transferred to the charge of Adoni range.

M. R. Ry. J. M. Abraham, R. O. IV Grade, is posted to the charge o Yempalli range.

M. R. Ry. Ramuni Menon, R. O. II Grade Ganjam Dt. privilege leave f 3 months.

M. R. Ry. N. Swaminatha Iyer, R.O. II Grade privilege leave for 2 months from date of relief.

M. R. Ry. K. S. Ramayya, R.O. V Grade is posted to North Coimbatore on return from leave.

This Cancels his posting to Begur Range, North Malabar.

7TH OCTOBER 1919.

M. R. Ry. K. M. Gopala Achari, R. O. in charge of Sriperumbudur range, Chingleput district, is granted sick leave on half pay, for six months, with effect from date of relief.

Mr. Henry MacBride, R. O. on leave is posted to the charge of Sriperumbudur range.

M. R. Ry. A. Manicka Mudaliar, from Kurnool West to Godaveri Upper, for the charge of Lakkavaram range.

Mr. S. A. Dawson, from Godaveri Upper to Kurnool West, for Sivapuram range.

14TH OCTOBER 1919.

The unexpired portion of 25 days' privilege leave granted to H. Mac. Bride, R. O. V grade is cancelled.

Mr. K. P. Benjamin, R O. III grade is granted privilege leave for 3 months from 15th December 1919.

21ST OCTOBER 1919.

Mr. A. A. F. Minchin, D. F. O., Ganjam, privilege leave for 5 weeks from or after 5th October.

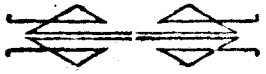
M. R. Ry. V. Narayana Ayyar Avl., E. A. C. to act as D. F. O. Ganjam, during the absence of Mr. Minchin on leave or until further orders.

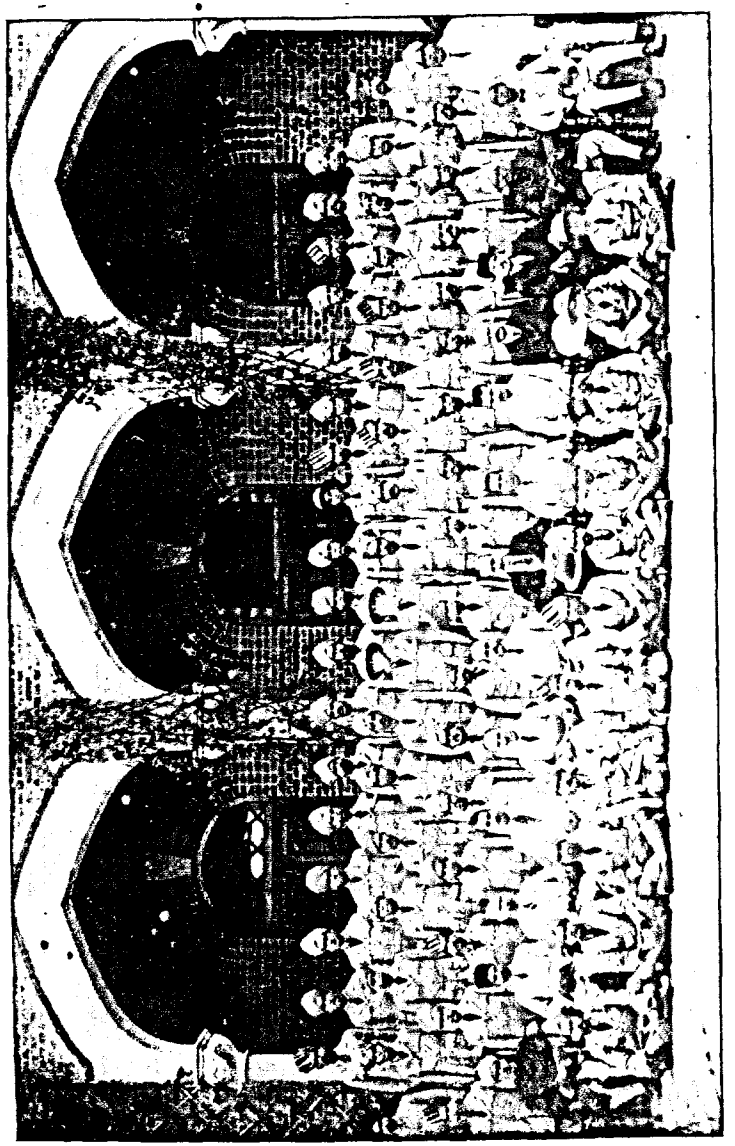
Mr. W. C. Hart, E. A. C. on return from Military duty, to be D. F. O. Tinnevlly, *cum* Ramnad.

M. R. Ry. G. Devanayagam Naidu, Ranger VI grade is transferred from W. Vellore, and posted to N. Vellore Division for the charge of Gudiyatham range.

M. R. Ry. S. Doraisamier, Ranger V grade, in charge of Anchetti range, N. Salem Dt., is granted privilege leave for 3 weeks from date of relief.

M. R. Ry. C. D. Parthasarathy Chetty, Ranger V grade, Gudiyatham range, granted Privilege leave for one month, and twelve days from date of relief.





His Excellency Lord Willingdon with the Board of Visitors, Staff, and Students, of the Madras Forest College, September 1919.

THE Madras Forest College Magazine.

Published Quarterly.

Vol. IV. March 1920. No. 3.

A Short History of the Madras Forest College, Ornamental Park, Plantations and gardens.

Short History of the origin of the Madras Forest College.

The earliest official record of the inception of the Madras Forest College is to be found in a letter dated 11th December 1907 from Mr. F. A. Lodge, Conservator of Forests at Coimbatore. It had been decided to construct there a special building for the Forest School for training Deputy Rangers and Foresters that had for some years previously been of excellent service to the Department in spite of the very limited quarters and equipment available for it in the compound of the Conservator's Office. In connection with this proposal Mr. Lodge urged that the opportunity should be taken to convert this school into a College for the Ranger class and for this purpose to construct a suitable and appropriate building near the Agricultural College 3 miles north of Coimbatore. These proposals had to pass through the usual official scrutiny for a considerable period and various modifications were suggested.

preparing and carrying out an estimate for planting trees &c., than the Officers of the Public Works Department."

The control and carrying out of the planting work in the College estate were then looked after by the Forest Officers at the College as at the beginning of the Scheme.

The following extracts from the Administration reports regarding the College Estate are of great interest:—

1912—13.

From every point of view it is a serious misfortune that the new site consists wholly of black cotton soil. The cost of the Arboretum, athletic ground and road-works, as a consequence, must be exceptionally high as regards both capital and maintenance charges. Under the supervision of the Imperial Instructor and Second Provincial Instructor experiments are being undertaken to ascertain what combination of artificial top soil over the pure black cotton will yield the best practical surface for the Athletic ground.

1915—16.

The menial staff is far from satisfactory and its members take every advantage of the lack of control during the absence of all authority when the staff is on tour. The low pay coupled with the situation of the College far removed from the "bazaar" gives no hope of any improvement in the future.

This holds good practically with regard to the care and improvement of the grounds and arboretum. During the absence of the staff on tour the gardeners grossly neglected the avenue and hedge plants and a large number of them died. Being low paid posts no skilled gardeners can be employed and for want of immediate supervision every

operation is done in a wrong and negligent manner. The pruning of avenue trees cannot be left to them and what has been done so far has been done in person by the Principal and his wife. [Mr & Mrs. Fischer] So long as this state of things continues the College Estate must continue to present the appearance of desolate waste which is in no way toned down by the building rubbish left here and there by the Public Works Department. A further difficulty is want of water. The present well and Engine can only just meet the requirements of the staff and the students during hot weather so that the supply from this source for watering purposes has to be cut off just at the time when it is most urgently required. Sanction for the erection of a wind-driven pump over the arboretum well has been granted and the disability will disappear when the pump is in working order

1916—17.

For domestic purposes and for irrigating the avenues, arboretum and nursery the requirements of the College when in residence amount to 7200 gallons per day, the actual supplies vary from 2400 to 3600 gallons per day. Hardship, inconvenience and lack of progress consequently result.

Owing to the cost of obtaining water, from a well outside the College Estate through a Contractor, casualties in the avenues cannot be replaced, the welfare of the existing trees cannot be safeguarded, the nursery has until lately been temporarily abandoned and the project of forming an arboretum has been held in abeyance for the past 2 years (it is now being started on a limited scale). If, by an increase in the supply the work of the Engine can be augmented to its full development the planting up of the Estate will rapidly progress and the grounds will present a very different aspect from their present unattractive appear-

residents on the estate suffer grievously from the lack of water. The obvious remedies have been hanging fire for 5 years The full requirements of the College during Head Quarter terms amount to about 14000 gallons per day of pumped water unless the rainfall is plentiful. Students' gardens and servants' gardens were started on the estate during the year."

A perusal of these extracts regarding the insufficiency of water in the College Estate may naturally lead any one to put the question

How do you manage to go on extending your planted area and to open students' gardens and servants' gardens in the Estate?

The answer is:—

(1) For want of scientific methods of lifting water from the nursery well and distribution through pipes for watering the planted area, a batch of 10 coolies is engaged to raise water from the well with heavy galvanised buckets and this water is transported with hand carts to the plants in the park and avenues. This is obviously a very uneconomical method but there is no way to get out of it under the existing circumstances.

(2) The use of water in the students' hostels and servants' quarters is very much economised and the used water from the bath rooms is not allowed to be wasted but is caught in big earthern troughs buried outside the bath rooms. It is this water that happened to be the real source of water supply to the servants' and students' gardens recently started. The students showed so much eagerness and sincerity in their garden projects as to cheerfully undertake the emptying of the refuse water from the earthern troughs with their own hands and created lovely little individual garden plots in the short space of about

7 weeks during the trying heat of September and October, before the break of the North east monsoon. These gardens at the entrance of the College along the Southern Road improve the general appearance of the hostel buildings and make these hostels quite cool and cheerful and they are an object of real attraction to the public. The ladies and gentlemen who pass along the road have their eyes attracted by these gardens during the few minutes of their walk or drive for a distance of about half a mile.

Conclusion.

A list of plants now thriving in the Estate is attached. The opening of the Ornamental park and the planting up of a great variety of different species of trees offer great opportunities for observation and study. It is noteworthy that plants in the open devoid of Acacia arabica trees thrive much better than those which are under complete or partial shade of the babul. The observation made in the Administration report of Bombay for 1917—18 regarding the toxicity of babul on page 52 (Sindh Circle) is also probably applicable to the plants in the College Estate. Further observations on this subject of toxicity will be published in the Magazine from time to time.

K. Ramaswami Iyer.
5—11—1919.

* List.

I. *Indigenous Species.*

Acacia arabica.
A. leucophloea.
Melia indica.
Morinda citrifolia.
Zizyphus jujuba.
Thespesia pupulnea.
Cordia perottettii
Feronia elephantum.
Balsamodendron Berryii.
Balanites Roxburgaii.
Capparis divaricata.
Dichrostachys Cinerea,
Tamarindus indica.
Ailanthus excelsa.

In June 1909 the Board proposed and a G. O. was subsequently issued to the effect that the vacant buildings of the Agricultural College at Saidapet should be temporarily utilised for the Forest College and a commencement should be made.

In 1910 the Bombay Government wanted that Bombay students should be trained at Coimbatore and suggested that instead of Coimbatore, Dharwar should be the site of the South Indian Forest College. The first proposal was protested against by the Conservators (Messrs. Brasier and Lodge.) The 2nd proposal was opposed by Messrs. Lodge, Peake and P. M. Lushington. In 1911 it was finally decided by the Government to locate the Forest College at Coimbatore. An area of 197. 76 acres was acquired. The foundation stone for the Forest College was laid by His Excellency Lord Pentaland on 9—4—1913. The construction was more or less finished in 2½ years and opening ceremony was made by His Excellency Lord Pentland on 14-10-1915.

Description of the site.

The whole area of the College Estate is black cotton soil. The depth of black cotton varies for 3 to 6 feet and the sub soil is disintegrated soft rock. The whole area was under dry cultivation, an annual crop of either Cholum, cotton, thenai or Bengal gram being raised by the ryots; the harvest entirely depended upon the monsoon. There were practically no wells or garden cultivation. The only well that existed in the area was a small dilapidated one east of the present museum site but the water in the well was said to be very brackish and was not used at all. The Public Works Department closed this well and had another sunk at the North east corner of the area. This well was the source of water supply for the contractor of all buildings and was supplemented from time to time from the Kumaraswami tank

about a mile Southwest of the site. The water from the tank was worked with an oil engine for about 6 months when the tanks contained water.

The well sunk by the Public Works Department was the source of water supply in the estate in the earlier days and continues to be the only source up to the present day for garden purposes. The well is about 75′ deep and contains a perennial supply of water. In the interval between 1911 and September 1915, when the College buildings were finally occupied by the students and staff, the area was more or less grazed over by village cattle. Goats played an important part. These animals which are destructive to forest growth were most useful in dropping dung full of Acacia arabica seeds. A spontaneous growth of Acacia arabica seedlings came up on the whole of the area. These seedlings established themselves and are now growing into big sized trees.

As soon as the well at the North east corner was sunk by Public Works Department a nursery about 2 acres in extent was laid out in 1912 near the well. Red earth was imported and mixed with black cotton for improving the soil. Plants were raised in the nursery. These were mostly used for the wind belt on the western boundary of the Estate and avenues for roads. At one time the planting operations for avenues were to be entrusted to Public Works Department but Mr. Richmond suggested to the Board in his No. 549 of 1913 dated 23—9—1913 as quoted below :—

Planting operations.

"With reference to B. P. F. No. 803/Routine dated 17-9-1913 I have the honour to respectfully suggest that the Principal and Instructors of this College, who are Forest Officers are more capable of

ance. The Executive Engineer has been asked to examine five possible expedients for additional sources of supplies (including a windmill, the acquisition of a second well to be worked by the present Engine and the collection of rain water from the roof of the College and all buildings). One or more of these projects should provide an ample quantity — it is doubtful whether the quality of sub soil supply will ever improve. The cost of planting has been enhanced by the nature of the soil, which necessitates in the case of each tree put in an excavation of many cubic feet to be replaced by red earth brought from a distance. Similarly this soil necessitates the embedding of all buildings, sign-posts, Gymnasium apparatus &c., in a deep concrete foundation.

In wet weather the land is a morass and it has consequently been found necessary lately to connect, by a gravelled path on a stable bed, all buildings frequented daily. The cost of maintenance of roads and paths and of all buildings (excepting such residential quarters as the Public Works Department agrees to maintain) will necessitate a considerable increase to the College budget. It would probably prove a real economy in money and in efficiency to place all the Estate works (road, planting, building) under the control of a whole time officer — a retired Ranger for choice."

1917—18.

In the meantime the College continues to suffer what can only be characterised as a grievous disability from lack of water. The estate is being developed but at a very enhanced cost and progress is necessarily very slow. If an adequate supply of water were assured — and it is only a question of funds and energy—a system of pipes and taps to all parts of the Estate would be laid out, progress would be both cheaper and quicker, the avenues and private gardens would flourish, the College Museum and all buildings would become covered with the bright blossoms of creepers and the nursery and arboretum would be of real instructional benefit to the students and the 25 acres surrounding the main building would be transformed into something approaching an ornamental park; it is now a dreary Babul waste, in the hot weather fissured with wide and deep cracks and covered with long spear grass and in the rains a morass.

Creepers and ornamental shrubs are being planted round the walls of the main building (as well as of the Museum) but their maintenance under the present conditions is expensive and precarious. During the year about 1200 trees have been planted in the avenues and arboretum and a large number of seedlings have been raised in the nursery.

1918—19.

An area of nearly 2 acres round the main building of the College was converted into an ornamental park in which many varieties of trees &c. were planted. The seedlings were obtained from the Agri-horticultural gardens, Teynampet, Madras. 2400 trees were planted of which 1200 were reserved for the Ornamental Park, 200 for the new avenues and 100 to replace casualties Creepers and Ornamental shrubs put down in the previous year were maintained at considerable expense. The College is still under the same disability as before as regards an insufficient water supply. The water available in the D. P. W. cistern is about 4800 gallons per day; the deepening of the present Engine well undertaken last year resulted in a very trifling increase to the daily supply. Owing to the laying out of the Ornamental Park nearly double the quantity previously considered sufficient for planting is required and this has to be obtained by hand carts at a very great expense. All

Under planting in Nilambur.

I have read with interest articles by several correspondents on the subject of underplanting at Nilambur. So far as I can remember, however, no one has prefaced his remarks by recounting *completely* the conditions to be fulfilled for a proper solution of this problem. Protection of the soil; removal of epicormic branches from the Teak; cheapness of introduction and the possibility of selling the material have, I believe been mentioned But, after a careful study of the Silviculture of Teak, the ruling condition to be fulfilled is, in my opinion, that *species selected must strictly remain as under-woods throughout the Teak rotation.* There must be no competition for growing-space between them and the Teak.

Silvfculturally and financially the Teak must be given "proper" growing-space — temporarily and at suitable intervals freed on all sides –, for the development of the greatest volume and highest quality. Nevertheless, whatever the growing-space given, the Teak is deciduous during the hottest months of the year and the primary object of an under-wood must be to give shelter to the soil during these months. That it should keep the boles of Teak clean of branches; be cheap to introduce and be saleable are entirely secondary considerations.

That numerous epicormic branches are to be seen on the majority of trees at Nilambur is a phenomenon, which, at first sight, might lead or rather mislead one into attaching undue attention to the need of an under-wood for their prevention, or at least removal. To remove them, an under-wood must be grown sufficiently dense to effect this by friction. Indeed, observation shows that reduction in intensity of light has little

effect. Light, in fact, is not even the primary cause of their origin. The chief causes are (1) restricted crowns, due to provision of insufficient growing-space in the past, and (2) defoliation by caterpillars which is immediately followed by the development of many dormant buds not due so much to increased light as to the attempt of the tree to obtain, in the interval before it can develop new crown leaves, sufficient leaf surface to maintain that concentration of the cellsap necessary for the vital functions of absorption and transpiration of water and therefore growth. The first of the above primary causes can be removed by provision of proper growing-space — thinnings aiming at "normal" crown development The second must remain so long as the defoliaters continue to be a pest. At the same time observation shews, other conditions being the same, that the better the crown development of a tree the fewer the epicormic branches that persist after defoliation. In fact the means necessary to remove the first cause will also greatly reduce the evil effects of the second. Finally, the presence of epicormic branches with the resultant knots in the timber has little effect on the price, except in the case of badly affected logs, the majority of which are obtained from seriously dominated or supressed trees — types which should rarely be found in pure Teak woods if properly thinned.

To sum up, the essential conditions to be fulfilled are :—

(1) The under-wood in Teak woods must not be allowed to grow to a height of more than 70 feet on the best and 40 feet on the worst soil.

and (2) The species forming the underwood must be evergreen, or if deciduous, leafless only for a short period, such as Dalbergia, Xylia etc: Several species can be named which would fulfil the second and it is therefore, the first which is the ruling condition. Subsequently,

II. Introduced:

Very successful.

Acacia auriculæformis.
Peltophorum ferrugineum.
Citharexylum subserratum.
Bassia longifolia. (Planted by H. E. Lord Willingdon)
Dalbergia Sissoo.
Terminalia Catappa.
Cassia Siamea.
C. emarginata.

Successful.

Kigelia Pinnata.
Lawsonia alba.
Hibiscus
Tecoma stans.
Allamanda.
Cæsalpinia coriaria.
Poinciana regia.
Duranta plumieri.
Thevetia neriifolia.
Jacaranda mimosifolia.
Tabernæmontana Coronaria.
Psidium Guava.
Punica granatum.
Hardwickia binata.
Thespesia pupulnea.
Ficus indica.
Cordia myxa.
Millingtonia hortensis.
Erythrina indica.
Santalum album.
Swietenia Mahogony.
S Macrophylla.
Grevillea robusta.
Holoptelea integrifolia.
Bauhinia tomentosa.
B. variegata.
B. purpurea.
B. racemosa.
Stephegyna parvifolia
Parkia biglandulosa.
P. Roxburghii.
Dodonea viscosa.
Mango.
Sterculia fœtida.
S. alata.
Bignonia megapatamica.
Berrya Ammonilla.
Lagerstrœmia Flos Reginæ.
L. indica.
Gliciridia maculata.
Pterospermum suberifolium.
Myrospermum toluiferum.
Schleichera trijuga.
Strychnos nuxvomica.
Gelonium lanceolatum.
Heterophragma adenophyllum
Sapindus emarginata.
Oredoxa regia
Moringa Pterygosperma.
Chrysophyllum cairito.
Odina wodier.
Melia azederach.
Wrightia tinctoria.
Adansonia digitata.
Auracaria kooki.

Elæodendron glaucum.
Crescentia alata.
Spathodea campanulata.
Ardisia polycephala.
Mimusops Kakhi.
M. hexandra.
M. elengi.
Filicium decipiens.
Careya arborea.
Polyalthia longifolia.
Dalbergia latifolia.
Dolichandrone crispa.
Calophyllum inophyllum.
Terminalia tomentosa.
Anacardium occidentale.
Albizzia Lebbek.
Nyctanthes arbor tristis.
Plumeria acutifolia.
Anona squamosa.
Ficus elastica.
Acacia ferruginea.
Achras Sapota (Planted by H. E. Lady Willingdon)
Ficus Benjamina (Planted by H E Lord Pentland)
Casuarina equisetifolia.
Eugenia jambolana.
Melia composita.
Adenanthera pavonia.
Dracæna sp.
Cassia alata.
Guazuma tomentosa.
Butea frondosa.
Bombax malabaricum.
Protium caudatum.

Failing.

Thuja Orientalis.
Cananga odorata
Tectona grandis
Castenospermum australe.
Hura Crepitans.
Pterocarpus Santalinus.
P. Marsupium.
Artocarpus integrifolia.
A. incisa.
Phyllanthus emblica.
Averhoa bilimbi.
Dillenia indica.
Coffee.
Brownea Coccinea
Ficus religiosa.
Putranjiva Roxburghii.
Calamus rotang.

having fulfilled the above, it must be advantageous if (3), the species will grow up sufficiently densely to prevent by friction the persistence of epicormic branches resulting from defoliation, and (4), by the end of the Teak rotation of 70 — possibly shortly 60 years, give a money yield, whether derived from timber — as defined in the Forest Code, firewood or other produce, which will at least pay off the capital outlay on their introduction together with Compound Interest accumulated to that date.

In conclusion I should like to see further contributions from your readers which would attempt to indicate one or more species that will fulfill at least the essential conditions referred to above.

R. BOURNE.

[We commend this interesting and suggestive letter to the careful examination of all practical Foresters who have had an opportunity of examining the problem.

By reason of his exceptional experience and study of the Nilambur Teak Mr. Bourne's views are entitled to the highest consideration. EDITOR.]

Sandalwood Observation Areas.

NAMAKKAL RANGE.

This article relates to the observations made in 1918—19. Observation area No. I referred to in my last article (The Madras Forest College magazine Volume IV. No. 1 Page 32 et seq.) was ordered to be abandoned. All the spiked trees in this area were extracted in March 1919. On 22nd July 19 we noticed spike reappearing here;

2 spiked trees close to the boundary line of the Observation area were noticed.

2. In observation area No. II, there were 9 spiked trees and a dead tree on 6-12-18. There were 11 spiked trees on 23—7—1919. Of the additions, one was in February 19 and the other in March 19. The phenomenon of dead twigs in branches of trees not attacked by spike is very characteristic of this area.

3. *Spike cannot be arrested in an affected tree by pruning off the spiked branches.* On 22—3—19 in the case of trees Nos. 33 and 73, 4 spiked branches and 1 spiked branch respectively were pruned off by me. On 25—4—1919 other branches were noticed to be spiked in both the cases. On 28—7—1919 we noticed that *all* the branches of tree No. 33 were spiked. Tree No. 33 was spiked in *one* of its branches on 3—12—18, in 3 of its branches on 22—2—13 and in 4 branches on 22—3—19. All the 4 branches were pruned off on 22—3—19. On 25—7—19 the *whole* tree was found to be spiked. The history of tree No 73 is as follows :—It was healthy on 3—12—18 and on 22—2—19; one spiked branch - the lowest branch of the tree — was noticed on 22—3—19 which was pruned off. On 25—4—19 the leading shoot was found to be affected. Again, in the case of another tree (No. 34) only one branch was spiked on 3—12—18, when it was pruned off. On 22—2—19, I made the observation that only top branches of this tree were affected. On 22—3—19 the leading shoot and 1 branch were noticed to be spiked. On 25—7—19 it was found that only one branch had normal leaves, all the rest being thoroughly spiked. I believe that observations on these 3 trees are conclusive enough to establish that spike cannot even be temporarily arrested by pruning off the spiked branches.

4. Another observation made here is that "*brittle leaves*" *is no sign of prospective spike in a tree.* On 3—12—18, the District Forest Officer noted down tree No. 151 and certain others as containing "brittle leaves" in large numbers. On 25—7—1919 it was found that *not one* of these half a dozen trees had got spiked.

5. *Uprootal of spiked trees has no effect on the surviving healthy trees.* In observation area No. I, all the spiked trees (74 in number) were uprooted in March 1919. In July 19, we noticed that 2 trees had just got spiked in this area. This fact is corroborated by what is happening in other parts of the range where spike prevailed and has again appeared after uprootal of the spiked trees.

6. In my previous article I made the observation that spiked trees took from 12 months and 2 days to 12 months and 23 days to die. The data given below would show that trees of 1 foot and below in girth (trees Nos. 32, 36, 83 and 156) have taken about 8 months to die. Trees of over 1 foot girth (Trees Nos. 23 and 33) take a longer time to die. Data with regard to death of spiked trees in Observation area No. II is given in the Statement below :—

No. on the tree.	Girth of the tree.	Spiked on	Health condition on 25—7—19.
23	1′ 3″	29-8-1918	Branches dead; tree almost dead; the tree had a few spiked leaves on 25—4—19.
32	4″	3-12-18	Dead; no leaves; had a few spiked leaves on 25—4—19.
33	1′ 2″	do	All branches spiked; tree is not yet dead.
34	1′	do	Only one branch with normal leaves; rest of the tree completely spiked.
36	8″	3-12-18	Dead; was leafless ever since 22-2-1919.
44	2″	do	Doubtful spike; there were 12 normal leaves; the other leaves were suspicious.
66	8″	22-2-19	Fully spiked.
73	2″	22-3-19.	The leading shoot alone is spiked; branches bear normal leaves.
83	7″	3-12-1918	Dead; leafless on 25—7—19; it had few leaves on 25—4—19.
156	1′	29-8-18	Dead on 25—4—19; on 22—3—19 it was noted as dying.
160	9″	3-12-1918	Fully spiked; branches dead; a few normal leaves at tips of branches.

7. In the case of tree No. 44 it was first observed to be spiked on 3—12—18; the health condition of the tree was then noted down as "half the tree spiked"; on 22—2—19 the observation was "spiked: three fourths of the tree affected"; on 22—3—19 the observation was "Fully spiked; very few normal leaves"; on 25-4-19 it was "few spiked leaves;" on 25-7-19 we noticed that while there were a dozen doubtless normal leaves on the sapling, the remaining leaves though dwindled in size were not spiked leaves. They looked like new flush of leaves but were not tender; nor were they confirmed spike leaves. We doubted whether this might, after all, be a case of recovery from spike. On 24—8—19, the doubts vanished as distinctly spiked leaves were noticed by me on the sapling.

S. G. VENKATARAMA AYYAR,
Forest Range Officer, Namakkal.

Extracts from "Forests and Gardens of South India" by Dr. Cleghorn published in 1861.

[The College Library contains a copy of this interesting work which throws much light on the conditions of Forest Work 60 to 70 years ago. The book contains several excellent engravings. Dr. Cleghorn was the first Conservator of Forests in Madras.]

* * *

The earliest reports published are those of Dr. Wallich, the first of which was dated so far back as 1827, and refers to the Salween Forest, north of Moulmein. The result of his labours may be said to have laid the foundation of a system of conservancy, without which it

would soon have become impossible to maintain even the existence of of our most valuable Eastern forests.

* * *

When Dr. Brandis was appointed by Lord Dalhousie to the charge of the forests of Pegu, it was intended to pursue a policy of strict conservancy, such as was proposed by Wallich upwards of thirty years before; but, as it was then impossible to adhere to it, it has again been found necessary to relax the stringency of rules which were too severe to be practicable.

In 1805, the Bombay Government, for the first time, laid claim to the indigenous forests of the western coast, and appointed commissioners to fix their boundaries, the Company's right of sovereignty being asserted by a proclamation issued in 1807. From this period up to 1822 a partial and somewhat ill-advised attempt at conservancy was made, but it thoroughly failed in its object; and all the restrictions which has been imposed during its existence were removed.

* * *

The Forest Department was not organised until 1846, under the superintendence of Dr. Gibson, who ten years afterwards published a short treatise, in which he gave a historical sketch of the department from its commencement. The handbook and Dr. Falconer's "Report on the Teak Forests of the Tenasserim Provinces" are works of the highest importance, especially to those interested in the preservation of teak forests.

* * *

A code of forest regulations for all India is much wanted. If this was drawn up and sanctioned, the rights of Government (which are

in some districts in a confused state) would be placed on as equitable and sound a basis as the rights of the people themselves.

The present volume was prepared at the instance of Government, principally for the purpose of furnishing a continuous view of forest conservancy in the Madras Presidency during the four years that the department has been in operation.

* * *

In the beginning of this century, an immense almost unbroken forest covered the Western Ghats, from near the watershed to the most elevated ridges, — left to nature, thinly peopled, abounding in wild animals, and all the higher portions, without exception, covered with timber. Now the passing traveller, looking down from the higher peaks of Coorg or Malabar, conceives that an inexhaustible forest lies below him; but as he descends the ghats, he finds that the best timber has been cut away, and that the wood-contractor is felling in more remote localities. I refer especially to teak, blackwood, and poon spars, which are every year becoming more scarce in accessible situations.

* * *

In regard to forest arrangements, I may observe that Canara, though still imperfectly organised, is in advance of every other district.

* * *

In the Official Road Book, published by Major Scott not many years ago, opposite Waliar, we find this remark, "Dense Jungle, beware of elephants;" but in looking from the staging bungalow, the traveller sees several tentative lines of rail, each 200 yards broad, and so extensive a clearing of the neighbouring forest, that no elephant could easily find

a cover. The encircling hills, formerly crowned with timber, are now to a considerable degree laid bare. These changes, so far as I can learn, have been the gradual result of unrestricted cutting, but much aggravated, during the last few years, in connection with the enormous demand for railway sleepers, and for the department of Public Works. In the contracts which have been made for the supply of the Bombay railway, 1½ rupee has been charged per tree. In some contracts for the supply of the Madras railway, 3 or 4 annas has been the seignorage per sleeper, according to the kind of wood and the facility of transport; and, with the permission of government, I would recommend that at least three annas be invariably paid.

* * *

The importance of saving every foot of teak (at a time when Government has been put to great shifts for its own requirements) has been strongly impressed upon every member of the department.

* * *

Along the whole length of the Malabar coast from Goa to Cochin, *there is now very little of this wood in a ripe state* on Government land below the ghats, and there are only three localities above the ghats where I found teak in abundance and of good size, viz.,—

(1) The Anamalai Forest in Coimbatore.

(2) Wainad and Haggadevankota (partly in dispute between Mysore and Malabar.)

(3) Gund Plateau, North Canara, near Dandelli.

The *prospective supply of teak* (roughly estimated at the rate of the present requirements) from the forest now rented from the Colongad Numbady *will not apparently exceed 15 years.* This is a serious consideration, as it is the only forest from which long planks suitable for a frigate can be procured. I have in view a scheme for consolidating the table land of the Anamalais, that part belonging to Government as well as that rented from the Colongad Numbady, into one Government forest, which should be a reserve in perpetuity for the Indian navy, and where planting operations should be systematically carried on.

* * *

The *average price of teak* at the quarterly auctions held at Mysore has been almost exactly the same as at Anamalai, about *one rupee per cubic foot.* I have experienced great difficulty in obtaining exact information as to the extent, tenure, revenue, and productions of this forest, on account of its being little frequented, from the fear of wild animals. In no place have I seen such abundant traces of elephants.

* * *

Conolly Plantation:—The fine and promissing plantations on the banks of the Nellambur River, which were commenced about fifteen years ago by the late lamented Mr. Conolly, Collector of Malabar, are worthy of a full and separate report, which will be a historical record of what can be effected by artificial means. These plantations will be an important source of supply in future years. They are under the immediate charge of Chatu Menon, a Nair, who conducted all the preliminary experiments under Mr. Conolly's orders, and who has watched the young trees from the day of germination. I propose that two

Duffadars should be sent, one to the Anamalais, and one to North Canara, to introduce the Conolly system of plantation into those districts.

* * *

Since writing this, I find that the Nair subordinates are unwilling to leave their native place. One has been found ready to proceed to the Anamalais, but no one is willing to proceed to North Canara on any terms; therefore one of the Canara establishment will be detached for instruction to Nellambur.

* * *

From information received from the late Assistant-Surgeon Drew, I was enabled to communicate to the commissioner of Mysore the existence of a large band of smuggiers in an unfrequented path near the Carkur Pass, who were captured by the Mysore horse, to the number of seventy-eight, with the sandalwood tied on their backs. This seizure effectually stopped a long-continued system of robbery on the Malabar frontier.

* * *

I here beg to annex extract of letter to the Collector of Coimbatore, dated 2nd October 1857, which contains my views in reply to a reference upon this important matter:—"The higher sholas, cooling the ghats on both sides, are of the utmost importance, and the climate is believed to suffer the greatest detriment from their removal. I would therefore suggest that the high wooded mountain tops overhanging the low country (such as Hoolieul) should be preserved with rigid care; the forest there should not be given over to the axe, lest the supplies of water may be injured. It is the opinion of many persons, in which I

concur, that the vast clearings which have taken place have had a share in producing the irregularity of the monsoon, which has of late years been so much complained of in Coimbatore. In order that the couse of the rivulets should be overshadowed with trees, I conceive that the hills should be left clothed to the extent of about half of their height from the top, leaving half of the slope and all the valley below for cultivation. This available portion would far exceed in extent the higher ridges, which should be conserved."

* * *

Difficulty of procuring Assistants.—The removal of Captain Michael to Hydrabad, followed by the withdrawal of Captain D. Hamilton and the death of Assistant-Surgeon Drew, put me in a difficulty for some time. The two first were most zealous and willing assistants, and the last, from his patient habits of inquiry and botanical knowledge, gave promise of peculiar usefulness. The vacancy at Anamalai has been filled by Lieutenant Beddome, an excellent explorer, who has a good knowledge of the vegetable kingdom, and was recommended to Government solely on account of his powers of observation and description.

* * *

Sub-Conservators in Canara.—The two subordinates I found in North Canara, under Mr. Muller appeared to be much too sedentary in their habits, deputing peons into the jungles when they should have gone themselves, and the like. The former has been removed from the department on account of incapacity; the latter is suspended under an inquiry for receiving bribes.

Enropean Contractors.—Two contracts have been entered into with Mr. Ross, resident railway engineer, Coimbatore, whereby he has

been permitted, first, to cut sleepers of certain specified woods in the forest near the foot of Anamalai, paying seignorage at the rate of 3 annas per sleeper; and, second, to fell 2000 trees in the Waliar jungle, at the rate of 1 rupee 8 annas per tree.

* * *

In several instances I have urged the location of two taluk peons, as at the top of Palamanair Ghat, and at Devaroydrug in Mysore. The vigilance of two men during twelve months, at a cost of 7 rupees per month, has produced visible results; although the conservancy has not been adequately provided for, yet the jungle already begins to assume a much improved appearance.

* * *

In addition to the absolute scarcity of suitable men, the exposure personal risk, and low salary compared with ~~that~~ sanctioned in the Public Works, have united to deter men from entering the department; whilst the formation of the Police and Revenue Survey Establishments have attracted others whose services might have been available. Out of the large body of Europeans who have this year been sent out to India, I hope to find one or two who have a practical knowledge of wood-craft.

* * *

I have the honour to enclose a specimen of the "Manual of Indian Botany," now being prepared in compliance with the wishes of the Honourable Court of Directors. The small amount of time which I can spare from other avocations, the bodily fatigue and exposure I undergo, and the absence from my library for great part of the year, will neces-

sarily protract the preparation of the work; but the great opportunities I enjoy of collecting materials are eagerly laid hold of, and I trust that the Manual may, when completed, be a useful guide to the botanical riches of the Presidency.

* * *

Colonel Gilbert's plantations, commenced in 1804, are generally failures, owing to the injudicious selections of site too near the sea. The Conolly Plantations, on the other hand, are in a very promising condition; and the Government recognise the very great importance of restoring the ancient and valuable forests of Malabar, and will be glad to receive the report preparing by Dr. Cleghorn.

* * *

The Conservator here represents the difficulty of procuring suitable Overseers; and he shows the causes which combine to prevent qualified persons from entering the department. If, on further experience, these causes are still found to operate detrimentally to the interest of the establishment, it will be Dr. Cleghorn's duty to propose a remedy in the shape of a higher scale of remuneration.

* * *

Specimens are to be seen in different parts of the plantations of trees from one to fourteen years old, all growing most luxuriantly, and with a regularity and straightness which leads me to suppose they will become very valuable timber. The older trees had not, in my opinion, been thinned sufficiently; but I have no doubt this error will be remedied under the able management of Dr. Cleghorn.

"I look upon this as a most important matter, and one worthy of being brought to the notice of the Supreme Government, as too great pains cannot be taken for increasing the future supply of timber. The native sub-conservator, Chatu Menon, is stated by Dr. Cleghorn to deserve the highest credit for his care of the plantations for fourteen years. He is desirous of receiving some token of the approbation of Government; and I would propose that an ornamental woodman's knife should be given him."

* * *

Two supplies of sandal-seed were sent to Major Phayre, commissioner of Pegu, for the king of Ava.

* * *

In anticipation of Lord Harris's visit to the forests, a wooden bungalow was erected, at a cost of about seventy rupees. This amount is included in the hunting expenses. The building has proved very useful for the establishment.

* * *

My writers and duffadar have several times been changed, the fever frightening them away; and one writer, who had been two years in the Forest Department, died from jungle fever.

The Madras Railway has hitherto used to a very great extent the indigenous woods for sleepers. About thirty kinds of timber have been tried experimentally, but the experiment has not been attended with satisfactory results—not always because the wood were worthless, but from the timber not having reached a sufficient age, and from its being used in a comparatively green state.

Teak, which is more durable that any description of fir, although prepared with creosote, and the best of all woods for sleepers, is considered by the officials of the Company too expensive.

* * *

Teak scantling of large size is becoming more and more scarce all along the west coast. The fact is, in Malabar, first-class logs are not easily procurable.

* * *

The most important are the "Conolly Plantation". These young forests have been hitherto a source of expense; but last year the returns for the first time exceeded the expense of their maintenance:—

Expenditure, 1859—60	... ...	Rs. 3493—0—6
Income,	... ...	Rs. 5165—2—9
		Rs. 1672—2—3

Situated as these plantations are on the banks of the Nellambur River, the value of the timber is enhanced by the fact that it is so easily transported, while the Malabar forests are so much exhausted.

* * *

At the close of this Report, it may not be out of place to draw attention to the fact, that since this department was instituted, three years ago, many changes have occured, and the field of operation has gone beyond the original scheme. In this way difficulties have sprung up which could not have been anticipated, and defects, therefore, can be pointed out which, while matter of regret, are only the natural consequences of circumstances beyond our control. The establishment is now too limited to embrace all the duties which at present devolve upon it. The extent of country to be conserved is out of proportion to the means placed at the disposal of the department for its protection. Originally, it was not contemplated that we should organise a police establishment, as it was understood that the forests would be under the same protection as other public property. The number of sanctioned peons — fifty three permanent for the whole presidency — is quite inadequate, and the forests, consequently, are only partially protected.

* * *

One great want of the department is, an additional assistant, who, while learning his duty, could afford useful aid, and afterwards be competent to fill any unexpected vacancy (such as those which have occured this year). Two hundred rupees staff salary would be sufficient. The advantage of a trained assistant on emergency is self-evident.

* * *

Exploring Tours.— During the past three years annual tours of about nine months' duration have been made, during which a very large portion of the presidency has been traversed, and all the more important forests have been to some extent explored. Considerable additions have been made to our knowledge of the interesting and important region of the Anamalais and confines of Travancore, by a second exploring tour of Lieut. Beddome, the report of which has already been published. The sal forests of Gunsur were visited by me in the early part of last year, and an extract from my diary is contained in App. G. When Mr. Beddome has visited the Nalla-malai range in Karnul, there will remain no extensive tracts of importance wholly

unexplored. The further examination of these will be undertaken as circumstances permit.

* * *

In may 1859, a sanction of Rs. 50 per month was granted by Government for the conservation and working of Sigur Forest. (G. O. No. 668).

* * *

Besides the supply of sleepers, there is a considerable amount of timber cut for building purposes, and an increasing demand for export. I have granted 300 licenses for permission to cut 6470 cart loads of timber in the forests of Salem, for the year 1859—60. A seigniorage fee of Re. 1 is paid for each cart load of wood; this amounted is collected at the different police stations under the management of the collector, and has been entered in the books as land revenue, without a separate column. I have no hesitation in stating that a much larger amount might be realized, if the holders of the licenses were made to abide by the terms laid down in the license.

* * *

Overseer Yarde reports having marked 2803 sandal-wood trees on the Javadi Hills, varying from 3 to 14 feet in length and 10 to 30 inches in girth. About 15,000 young plants have been counted and ann registered; I am now proceeding to these hills for the purpose of ascertaining whether any of the sandal-wood trees are full grown, and fit to be cut into billets.

* * *

On 31st January 1859 I took advantage of the departure of Her Majesty's steamer, Dalhousie, to visit the Norther Circars. On the following day, the vessel touched at Eskapilly in Nellore, to take in treasure. The shore is barren of wood; palmyrahs are seen among the sand hills; but, except the extensive salt pans, there is nothing of any interest.

* * *

My attention was directed to a Mangrove belt on the edge of backwater, which was formerly barren waste. In the year 1839, two cart loads of seeds of species of Rhizophora (Uppa ponna), Avicennia tomentosa (Mada chettu), and Sonneratia acida, had been procured by Mr. Rohde (at that time Judge), at a cost of 25 rupees; the seeds were dropped into the mud of the estuary by convicts. The belt sprung up quickly, and has been annually cut, yielding a trivial revenue as fire-wood and for feeding cattle. It is also useful in preventing the channel from being clogged with drift-sand. In the canal basin, I saw a dozen firewood boats which had come in during the night from the Godavari, and concealed below the heaped up billets I recognised house beams of Yepi (Hardwickia binata), and Siriman (Conocarpus latifolia).

Vizagapatam, 6th.— This is a picturesque station, but the red soil does not seem suited for tree-culture; and the only places where I found fine trees were the gardens of Goda Surya Prakasa Rao and Narayan Rao; there were mangoes, sapodillas, oranges, and Lagerstroemia Reginæ. The cashew thrives well at Waltair.

* * *

It may be well to mention, that there is a good road from Ganjam to Russelconda (via Berhampur), in which the streams are all bridged,

and carts have recourse to the forest from Russelconda, and even Ichapur, a distance of 76 miles. It was a most interesting sight to see 80 children of the state (Sirkar ki Bacha), as they call themselves, — rescued Merias, engaged in making a road, calculated to develop the resources of the country, and to civilise the Kunds. The wage of these Merias was Rs. 4, and boys Rs. 3 per mensem. I put the following questions to the headman of a Meria village, who was the first man rescued from death.

* * *

The casuarina thrives well, and furnishes a useful wood, which, however, does not answer for fuel, as it does not split easily, and yields little wood when pollarded. Besides, it would be better to plant quick-growing woods.

* * *

All that is wanted is conservancy, so as to prevent tracts being quite cleared, to hinder persons from injuring the roots, and to arrange for the renewal of trees cut down. One part of this scheme would be to leave a certain number of standard trees per acre, say thirty or forty for shade and for seed, instead of shaving off everything to the root, by which means both the medicinal products as well as the larger fuel will gradually but certainly disappear.

* * *

At the close of the present lease it will be well to consider whether it be advisable to continue the system of renting out an eighth portion of the forest *to be cut down to the ground*. If the trees were headed down to 6 or 8 feet and allowed to produce lateral shoots,

these would become very numerous and produce a greater supply of branches to be sold in bundles for firewood.

* * *

And the question is frequently asked by private individuals, "what is the best kind of tree to grow for firewood" There can be no doubt that, in the neighbourhood of large towns, along the lines of railway, in the vicinity of iron foundries, sugar factories, engineers, workshops, &c., this necessary of life is more scarce and expensive than formerly, owing to the greater distance from which it is brought and the unrestricted license with which it is cut.

The marvellous changes which are taking place will probably render new regulations necessary for the continuance of the supply. The consumption of fuel is very great near some of the works alluded to. It is not far from the truth, that four sugar factories (Astagram, Aska, Chittavalsa, and Rajamundri) burn from 10 to 20,000 tons each in the working season: and the railway demand for sleepers requires 20,000 tons for every fifty miles under construction, besides other factories and great works hastening the clearance of the jungles.

* * *

In Utakamand, the ripe trees of the indigenous sholas are sold by auction, fetching a small return (Rs. 20 or 30 per shola). As the influx of settlers increases, the original tree vegetation will disappear entirely, prohibitory rules will be futile, and then proprietors will plant according to their own requirements, and a few probably for profit. The experimental plantations of Government show that this may be done successfully.

I may mention that, in particular districts, the names of certain civilians are long remembered in connection with the planting of topes and trees. For instance:—Mr. Orr, Salem; Messrs Sullivan and Thomas, Coimbatore; Mr. Robertson, Bellary; and Mr. Rohde, Guntur.

* * *

There can be no doubt that the forests in the vicinity of the hill stations have greatly suffered of late years; but private planting, at least at Utakamund, is largely on the increase. I have no doubt that, in the course of the next ten years, the wants of the community, so far as fuel is concerned, will be in great measure supplied from private plantations The great object in the meantime is to prevent the Government woods being destroyed.

The conservation of these is necessary to preserve the water springs, for shelter, &c; and I may here add, that so long as persons can cut *ad libitum* in Government forests without payment, the most powerful incentive to private planting is lost.

It is difficult to say exactly what the requirements of the Utakamund community may be. There are at present 7420 houses (European, 273; native, 7147*), and I suppose about 4000 fires are daily burning during great part of the year. For six or seven years past the main supply has been brought from the west-ward; and on the side of the road to pykara, about twenty sholas (large and small) have been very much thinned out.

* ("The population cosists of -- Europeans, 2500; natives, 34,500 East Indians, 500. Every European house has three or four fires daily,"—E. B. Thomas, Collector.)

* * *

With the funds thus procured, I expect to be able to entertain one, if not two additional European foresters. The expense thus incurred will be Rs 35 for one forester, with six peons each, Rs 35; + 65 = 100. Without additional aid of this kind it is hopeless to attempt efficient conservancy.

* * *

I have visited Mulumalai Forest to enable me to report on the system of management, in accordance with the order of Government, 4th July 1859, No. 1637. The size of the logs there is greater than at Sigur, averaging 16 or 18 feet; and I think if Col. Lawford had the same opportunities of judging as I have had when traversing the forests he would not have condemned the timber. The quality generally appears to be excellent; the quantity in seasoned logs is not far from 25,000 feet; of this I saw 18,000 feet, which had been dragged to the side of the forest road.

* * *

Apart altogether from the possibility of the seat of Government being transferred to the Nilgiri Hills, other important movements are either progressing or contemplated; and, indeed, it has recently been found necessary to appoint a special assistant to take charge of this important range.

* * *

The greater part of the wood brought into Utakamand is fetched by Badagas, and is cut within 2 to 7 miles of the limits of the cantonment. The right to move dead trees necessarily induces an interest in destroying them. The present establishment, consisting of a forester and 6 peons, for the conservancy of the Nilgiri Sholas,

seems susceptible of improvement. One or more foresters are required; but the peons, unless instructed and carefully selected men, are comparatively useless.

* * *

Let us take, for example, *Wellington. That station may be said to be entirely destitute of trees.* Having had frequent opportunities of observation during the last three years, I am strongly impressed with the opinion that the larger proportion of disease at Wellington than at the neighbouring station at Kunur, is due, in a great measure, to this circumstance, viz., the want of wood; as, in all other respects, height, temperature, exposure, &c, there is scarcely any appreciable difference between the two places. I think, therefore, that, by planting trees judiciously, great benefit would be derived, not only from the shelter they would afford, but from the good effects produced by a moderate quantity of vegetation in purifying the atmosphere.

* * *

The Government readily sanction the small sum of Rs. 1350, requested by Dr. Cleghorn for the ornamental planting of 10,000 trees in the neighbourhood of Utakamand, under the superintendence of Mr. M'Ivor, under the conviction that the outlay is trifling in comparison with the advantages to be derived from the proposed plantation, even in an economical point of view, and that it is highly desirable that an example of successful planting should be placed before the residents on the hills in each of the chief places of resort, as an encouragement to others to engage in an enterprise which, while it will be generally beneficial, will also be individually remunerative.

In 1856, Mr. Tuke was sent to explore the Savitri river, He penetrated into a forest about 130 miles distant from its mouth. He mentions, that he had no doubt that there were 800 good (teak) trees in the neighbourhood of Kannirirada He specifies, that he met with trees measuring 11 and even 15 feet in circumference, and from 30 to 45 feet in length, proving that the teak grows to its full size in that country.

* * *

Avenue trees are of immense consequence to the trunk roads of the country, and in some districts, they are nearly as essential to the convenience of travellers as a smooth surface. It has been proved, I think, that carts travel further in a shady road than in an exposed tract.

* * *

Dalbergia latifolia.— Planks 4 feet broad are often procurable, after all the external white wood has been removed.

* * *

The present price of teak wood of long scantling is Rs. 3 per cubic foot, double the ordinary rate.

* * * * *

It is stated on the authority of Major Lawford, that the true Sissu, *Dalbergia sissoo,* is found in great abundance in Wainad.

* * *

The appointment of Conservator of Forests was made in December 1856.

Bassia longifolia.—Good wood for trenails; it is comparatively free from the attacks of the *Teredo navalis;* it is procurable among the logs brought down the Godavari. It is valued for all purposes, in situations where it is not exposed to air, as planking of ships below the water line, frames on which well walls are built, &c., Nearly equal to teak, but smaller. Much used for constructions of carts at Coimbatore; and in Malabar, where it attains a large size, it is used for spars.

* * *

And the opening up of two new roads which have been for some time under the consideration of Government — I refer to the Karkur Ghat in Malabar, and the proposed road from the Anamalai Hills to the Cochin backwater — would facilitate the delivery of the wood. These great lines (the latter especially), would open up dense forests, and throw much * angili timber into the market.

* * *

Mr. J. S. A. Kohlhoff, Conservator of Cochin Forests, writes:- "I have the honour to acknowledge the receipt of your letter, enclosing a letter from Dr. Cleghorn, calling for information regarding the probable, quantity of * angili wood obtainable annually in the Cochin Forests, and beg to state in reply, that, owing to the high rate that angili wood sells at in the market, and it being considered more durable than teak for building boats, &c., such great quantities of it have been annually taken away by timber merchants, that the greater portion of these forests are almost exhausted of timber of this description. There is, however, a tract of magnificient virgin forest, at an elevation of nearly 3000 feet, about 40 miles S. E. of Trichur,

extending to the S. and W. of the chain of hills marked Nocoon bund on the Survey Map, No. 62, which have never been penetrated by timber merchants, where I have observed the angili growing in abundance, many trees of the largest dimensions, and have been informed by the kaders (or hill men), that the tree is very numerous in all the sholas (or dense jungles) on those hills. I have reason to believe, therefore, that this tract of forest is fully capable of yielding at least 2000 candies of angili timber annually, of superior quality and dimensions; as also a good supply of poon spars for ships' masts."

* * *

Mr. C. F. Kohlhoff, Conservator of Forests, Travancore, writes:—"I have the honour to acknowledge the receipt of your letter, and in reply beg to state, that the angili wood trade in Travancore is an open trade, where in the sirkar have no dealings whatsoever."

* * *

Anaimalais:—The upper ranges are in undisturbed possession of wild beasts; we saw a large herd of bison, with deer and ibex in numbers, and also traces of wild elephants.

* * *

In January 1845, the Government of India, on the recommendation of the Government of Madras, authorised an increase to the teak plantation establishment of the collector of Malabar, which raised its aggregate cost from Rs. 221 to Rs. 314—8—0 per month, including Rs. 50, the salary of the native sub-conservator. This increased establishment was represented as necessary in consequence

* [Artocarpus hirsuta. ED.]

of the extended scale on which planting and sowing were being carried on by Mr. Conolly, whose report calls for some notice.

* * *

There was, however, yet another difficulty to be overcome before the plans pursued by Mr. Conolly could be perfected; this was the pruning and tending the young plantations. On this point Mr Conolly was endeavouring to afford all the assistance he could to the sub-conservator, who was a native of the district, by instructing him from books which had been sent out for the purpose by the Court of Directors instead of the arboriculturist, for whose services so many applications had been made.

* * *

I can assure the Honourable Court, that their expression of confidence in Mr. Conolly's exertions for establishing a good system of management in the teak forests, as far as the plantations are now advanced, is well merited. I have had much experience in plantations and woods on my own account at home, as well as in those of other proprietors, but I never saw a better commencement than in the Government teak plantations of Malabar.

* * *

I may remark, from all I have heard and observed, that teak requires the same soil as oak, viz., a strong pure clay.

* * *

Extract Letter from H. Cleghorn, Esq., M. D., to the Secretary to Government.

Sir,

27TH SEPTEMBER 1860.

"I have the honour to acknowledge the receipt of the order of Government, dated 25th instant, calling for information regarding the supply of teak-timber of large dimensions from the W. Coast for Admiralty Purposes. The old forests of Malabar do not now contain much timber of frigate Scantling.

* * *

Looking at the increasing scarcity, and the greatly augmenting demands for timber, I think Government should begin at once to plant freely. The Conolly plantations are now beginning to pay and promise well. I would urge the doubling of the grant for this. We now plant nearly 70,000 trees annually for about Rs. 3000, which include the care of those already planted; with Rs. 6000, or only £ 50 per mensem, we could almost double the rate of progress, and I am confident it would prove a good investment. I have explained my views to Lieut. Beddome, who will arrange satisfactorily for this extension of operations, if Government sanction it."

[LETTER ENDS.]

* * *

Planting operations on a large scale have been commenced on the Madras side since 1843, with the same laudable design that led the Government of Bengal to attempt the same thing here in 1800 and 1812. The young trees have been planted to the number of 450,000 at 8 feet apart. It is to be hoped, that the failure on this side will be before

them, as a beacon to warn them from committing the errors which were fallen into here, and which proved so ruinous in the end.

"H. FALCONER, M. D."

All cases of violation of the forest rules may be tried and decided by the Superintendent of Forests, either by personal inquiry into the facts, or on the record of inquiry made by a forest assistant. In any case the decision, and the grounds for it, shall be recorded, and the same will be open to appeal to the Commissioner.

Whenever a person is sentenced to fine, and in default to imprisonment, by the Superintendent of Forests, the person so sentenced shall be forwarded without delay to the officer in charge of the district within which the offence was committed, together with a copy of the sentence, and the said officer shall forthwith proceed to execute it.

By order of the Commissioner,

D. BRANDIS,

Supt. of Forests in Pegu.

* * *

Some years since (1839), one Agri-Horticultural Society was established in Bangalore, under the auspices of the Commissioner, who made the Lal Bagh over to them, and afforded other assistance in the way of convict labour, &c. In all other respects, the Society was supporters, by private contributions; but the constantly fluctuating number of subscribers, the frequent departure of valued supporters, and other similar causes, led to the dissolution of the Society in 1842; and the garden was then restored to the Commissioner.

As above stated, the Mysore Agri-Horticultural Society was dissolved in 1842, owing to the constantly fluctuating state of society in the station.

* * *

Forest Rules in Sind.

The establishment of the forest department consists of 1 Forest ranger, 2 deputies, 1 Inspector, 1 accountant, 1 head munshi, 1 second munshi, 2 writers, 12 forest karkuns, 2 daroghas, 13 jamadars, 98 peons. The forest ranger has the general management and control over the whole department; he personally inspects the forests during six months of the year.

* * *

The total cost of the establishment is Rs. 2199 per month. The total extent of forest under supervision it 700 square miles on the lowest computation, and thus the cost of supervision is on an average Rs. 3 per square mile per mensem.

It is calculated that this year, 1859-60, for every rupee expended in establishment Government will receive back Rs. 2—9—7.

* * *

Utakamund Garden.

6TH AUGUST 1857.

The earlier stages of the garden's existence have passed; and I need not perhaps allude to the great difficulties to be overcome in commencing a garden on these mountains with a scanty income of Rs. 100 per mensem, and the experience to be gained before exotics from various lands could be successfully introduced.

On the other hand, the Acacia robusta of Australia is in such abundance as to stamp a peculiar feature to the scenery, which is entirely wanting in the drawings of Utakamand (Colonel M'Kurdy's) printed fifteen years ago.

* * *

Apprentice D. Hopkins, aged seventeen years, has been three years in the gardens; for the first two years he received Rs. 10, and this year Rs. 15 per mensem. He writes the garden accounts, and has been trained to practise grafting, budding, &c. It is proposed that he receive Rs. 20 a month during the fourth and last year of his apprenticeship. Another lad, aged thirteen, has been instructed for six months, but he was found to be deficient in preliminary training.

The system of instituting a class of apprentices is a good one, of special importance to young lads of European parentage, and I hope it may be followed out. Mr. M'Ivor could now take the supervision of two or three more, say from the Male Asylum. Lads of robust health and moral conduct should be sent.

* * *

Before, closing, I venture to suggest that Mr. M'Ivor having now served the Government for nearly ten years without any increase of salary sought or proposed, might reasonably be allowed an increase so as to raise his allowance to Rs. 200 per mensem, on the express condition that he devotes his whole time unreservedly to Government service. In addition to the garden superintendence, he might be required to undertake the management of certain tree plantations in the immediate vicinity of Utakamand, to which I shall allude in a separate communication."

The following extracts from "Forestry in Southern India" by Major-General H. R. Morgan, will interest modern Foresters.

"A Forest Officer to be really useful should know first and foremost the language of the people; without this he is useless, or at best, at the mercy of intriguing interpreters; in addition to the language, the habits and customs of the people, then Arboriculture in all its branches, next Engineering and Surveying—how to build houses and bridges, survey roads, and blocks of forest, &c., run boundaries by a pickaxe trench; and mounds of earth, stones are useless; physic his people when ill, treat them with tact, attend to the health of his bullocks and elephants, and last but not least, keep his own health, answer endless letters, and understand accounts.

* * *

The best soil for a Teak plantation is a sandy clay on on the banks of a stream, the ground should slope gently towards the stream, if too steep, the soil on the top of the hill is apt to be indifferent. There are other soils such as a brown surface soil with a rather retentive sub-soil of yellow clay; in such a place Teak grows well.

* * * *

For this year 1882, Teak is selling in Madras for 2-8-0 to 3-8-0 per cubic foot.

Nellumbore Teak-plantations.

I had since 1860 been more or less connected with these splendid plantations until I retired from the service in 1874, when working the Mudumalai Forest for the Wellington Barracks which I was engaged in building, I had occasion in 1857 to visit the Rajah of Nellumbore about forest matters, and first saw the Teak plantations then about thirteen years old; in 1860, I visited them officially and found that the 1845 plantation had never been thinned, and required to be operated upon at once. The 1843 and 44 plantations had been thinned more by failures than by the hand of man—they were poor and of no extent; but the 1845 was a very fine one, and the old Overseer Chatoo Menon could not bring himself to cut out the trees. I had to mark the trees myself and followed by half a dozen axe-men, in a week we had made a considerable gap, and the ice once broken, the old man went on thinning out under the auspices of Overseer Hall whom I sent down to assist him. This, 1845 block should have been thinned three years before the trees were crowding each other and making no progress.

Management.

Thinning.

Chatoo Menon.

In 1860 I was enabled to appoint Mr. Ferguson to the charge of these important plantations, and Chatoo Menon retired on a pension which he had well earned. Here I must record how faithfully and how well this native had served the Government; connected with the Nellumbore Rajah's family, he had position, and being immediately under the orders of the Collector, he of course, derived considerable support from the Revenue authorities. From 1843 to 1860 Chatoo Menon had been incessantly engaged in planting, and had put out about a million of Teak plants on 1,200 acres. Mr. Ferguson a practical Forester, soon mastered the details of planting and pruning, and when I saw the 1845 plantation in 1872 the

Mr. Ferguson 1845-trees.

trees were about seventy feet high and fifty feet without a branch,—they were then nearly thirty years old, and had then over fifty cubic feet of timber in them, They have now over one hundred cubic feet in 1883.

* * *

Col. Beddome's report on the plantations.

With regard to the stag-headed appearance of some of the trees, I could only account for it by supposing that Colonel Beddome had seen them early in the year when perhaps some of the ends of the top-most branches had not developed their leaves, or from being struck by lightening for I could not find a single stag-headed tree. On going over the ground, I saw a number of fine Teak logs on the ground, and on enquiry was shown the stumps from which they had been cut; on examination of the logs, I counted seventy rings, and the conclusion I arrived at was that the stump was not less than one hundred and fifty years old, and might, from its healthy appearance, produce another shoot equal to what it had already done — as this was natural Teak growing close to a plantation, it became evident that the soil and climate was quite capable of producing very large trees, and that they would be healthy certainly up to one hundred and fifty years of age, and probably to two hundred and fifty years; and I have not the slightest hesitation in saying that I consider the Nellumbore Teak plantations capable of enduring for centuries.

My report on the plantations.

Cause of disease.

Age of Teak trees on the land.

Suitable climate & soil.

* * *

Officers to study at Nellumbore.

In 1860 I recommended to Government that every Forest Officer should be passed through Nellumbore that he might learn practical planting on a large scale, and I believe three or four Forest Officers were sent to Nellumbore.

* * *

Burning of Teak Depot, Anamallies.

It appeared that a very large quantity of Teak leaves was driven by wind against the stack of timber and lodged there; when the forest was on fire, sparks caught the inflammable Teak leaves, and these being set a-light, communicated fire to the stack. No one found it out for two or three days; when the alarm was given, the Forest Officer was miles away, water was not available, and the huge stack of timber burnt on. It was specially fine timber, having been selected for the building of a frigate, and the loss was great. At last the Forest Officer arrived, and by means of his elephants, put out the fire by burying the ends of the logs in the ground.

* * *

On the Anamallies the elephant drags by the teeth; so they do in many parts of Malabar. It is a most pernicious practice, because it loosens the teeth, and an elephant's grinders once out of order, he has to be laid up for a long time before he recovers. I am aware that the elephants do not entirely depend on their teeth, but assist themselves by means of their trunks, still they cannot always avoid heavy jars.

Elephant's food.

The Mahouts are very fond of giving raw rice or paddy to elephants, the result is that much is stolen, and much passes through the animal undigested. To obviate this; there are two courses — one is the Burmah custom of giving baked cakes of rice, the other, the one I always pursued in the forest, was to damp the paddy for three days till it germinated exactly as barley is malted for beer. I found my elephants kept in better condition on thirty pounds of dry paddy, treated in this way than on forty pounds given unmalted. Mahouts

are very fond of asking for massala for elephants and of doctoring them, some of them are skilful in curing wounds of the feet, or sores on the back and shoulders. Elephants are subject to worms, and frequently eat mud as the Mahouts phrase is "Mutteekhaia hei"—the fact is the elephant delights in a salt lick, quite as much as a deer, and should have salt in his food frequently, the Mahouts never give it if they can help it. They prefer that their elephants should be laid up for two or three days after eating mud. In wet weather elephants should have massala, and if possible be kept under cover at night.

Medicinal as well for worms.

This is natural when they eat mud.

* * *

In dragging timber, rollers are rarely used, but in some places, they are of immense use saving the elephant and rendering the transport of huge beams possible. I have seen three elephants harnessed to a log, and unable to move it, simply because rollers were not used. A powerful elephant will drag fifty cubic feet of timber over level ground, but when it comes to dragging over hills and swamps, he cannot manage more than thirty feet, and even that with difficulty.

Rollers for dragging.

* * *

It is of the utmost importance to keep your animals in good condition, unless closely supervised; the Mahout and bullock-drivers starve their animals, and the work of the forest comes to a dead lock. On the subject of saw-mills, I can only refer the reader to Major Campbell Walker's work, "Reports on Forest management in Europe." I have no faith in elaborate arrangements within the forests. The fever and other

Saw-mills.

drawbacks soon render any machinery useless. In North Canara where elaborate arrangements were made for the introduction of the sawing machinery, the Engineer, soon after arrival, died; what has happened to the scheme, I have not been able to learn, but so long ago as 1860 I was consulted about machinery driven by water-power, and I was against it for the following reasons:—

1st. Any skilled labour would be very liable to be lost through fever.

2nd. That sawing Teak, and sawing deal were two very different matters, that it was very easy for an American to go into forests with a saw in his shoulder, set up his mill in the forest, and saw away any amount of wood, having no fear of fever before his eyes; but with Teak is was different, the wood was not only very much harder that deal, but was full of oil, the hardness of wood caused the saw to buckle; the oil clogged the saw. Mr. Groves, who had a circular saw driven by water-power in the Segoor forest, was obliged to drive his saw very slowly, or he got no work done; again, on account of fever, his men were perpetually laid up, and he had to sharpen his saws himself, a very fatiguing operation, his saws buckled if he did not closely superintend the work, and to straighten a circular saw, requires some skill. It was always my opinion that the Forest Officer and his establishment had quite enough to do to work the forest in the roughest manner. Even if establishments were doubled, they will be sufficiently occupied with planting, supplying the market demands, and conservancy generally. Allowing for fever and its concomitant evils, there will never be more than one-half the establishment at work all the year round.

Saw-mills.

Fever and other drawbacks.

At one time I was very anxious to obtain a small portable saw-mill that could be set up in any part of the forests, and simply cut a beam in half longitudinally, as sometimes, I have had over thirty beams in one spot, each over sixty cubic feet that required to be reduced before they could be got out of the forest, and was obliged to employ sawyers, as it was not possible to obtain a portable Sawing Machine. The sawyers, what with fever and advances, gave endless trouble as they worked in a set of three, if one man was ill, the other two were idle, and, of course, got into debt, and all work was at a dead lock. There are many trees in Wynaad and the Anamallies which measure over sixty cubic feet, and to cut them in half (say they are thirty feet long) is to ruin them for large spans so much required in engineering works, but this was found to be the common custom in Wynaad under the Assistants; in spite of orders to the contrary which were to keep logs up to forty cubic feet intact. A fifteen-foot log represented a cart-load, and so they cut them to that length, thus reducing the value of the timber to one-half.

Management of Teak Forests.

When I was sent up specially to build the Wellington Barracks, in 1856, I found they had no timber on hand, and could only obtain a small supply from the Anamallies with difficulty at an immense cost, for it was carted up the old Coonoor Ghat, some of the gradients of which were one in six. The estimate for the timber was six lacs or three rupees a cubic foot delivered. The Anamallies at that time were

Wellington Barrack's timber supply.

delivering all their best timber at Poonani for the Bombay Dockyard, and for which they received Rupees 3-8 the cubic foot, so it was not worthwhile to sell under that sum to the Barracks delivered at Coimbatore; the cost of the carriage from Coimbatore to Wellington never was fairly known, as dozens of bullocks died in bringing up the timber, and were not charged to it. However, the case stood thus: the estimate for the timber was three rupees, and it was costing over Rupees 4—8 the cubic foot, and even at that price only a little was to be obtained. On arrival, I found the Ootacamund Timber Market had not a log over fifteen feet, and we required a very large number over twenty-four feet for girders. Fortunately, I was able to secure a rented forest, adjoining the Wynaad Teak Belt, and by 1860 or in less than four years, delivered two-hundred thousand cubic feet of timber to the Barracks at a cost of only one rupee per cubic foot, after all charges had been paid. In working this forest, I at once introduced elephants, the Coorumbers had to be trained to fell only the largest and best trees as they were in the habit of felling a tree that would just measure about twelve cubic feet, as they were paid by the log. I introduced the system of payment by the cubic foot, and they soon learnt the value of it; at one time they gave much trouble, every large tree was "Swami Tree," and could not be cut; even this difficulty was surmounted. Of course, on taking over a forest, worked by a native, it was necessary to re-organise the establishment, make roads, build carts, and in fact, provide for an extensive establishment. At one time ten elephants and thirty carts were at work, as time compelled us to use our utmost exertions to get out as much wood as possible, not only to [illegible]

Saving by working a a rented forest.

Re-Organization of establishment and new mode of working.

of the Barracks, but to take advantage of the lease which expired in a certain time. Afterwards it was renewed for ninety-nine years, and some planting was begun; but I did not persevree in it as the lessee demanded a stump fee, and the land and climate being better further west in the Government Forest of Wynaad, I planted sixty acres there. The cost of carriage, some eight miles, was a charge, but then there was no stump fee, and the Teak grew straighter and faster further west. It would be still advisable in the west of Mudumalli Forest to put in germinated seed, as this would not be a plantation, and no stump fee would be payable. Amongst the public buildings supplied from these forests in addition to the Wellington Barracks were the Lawrence Asylum, all the bridges on the new Coonoor Ghat, Court-house of Ootacamund; Bangalore Barracks, numerous bridges in Wynaad. The surplus timber was sold by auction in Mysore and Ootacamund. I may here observe that in addition to all this emergent work, I was constantly at the Barracks superintending the work, and pushing it on. To expedite matters, I had twelve sets of sawyers, and thirty carpenters at work, at Gundulpett just outside the forest; they made up doors, windows and flooring; for two years they were employed, this in addition to a numerous staff at Wellington. I merely mention this to show the amount of work that had to be got through between 1856 and 1860, though I was not in the Forest Department at this time. I was obliged to do all the work of a Forest officer in addition to my engineering duties which were heavy.

Plantations. Stump fee.

Improved leased forest by seed sowing.

Public buildings supplied.

Anamallies.

After a visit to the Anamallies, in 1860, it struck me that sufficient attention had not been paid to the housing of the officers and their establishments. The situation of the buildings was in a hollow, and most depressing and unhealthy: the site was chosen because it was near the water!! and a better spot for catching fever could not well have been chosen.

House for forest establishment.

I selected a site on a ridge, a few miles off, close to the forest work, and where, by sinking wells, good water could be obtained. I further recommended that all the houses should be upstair ones; the sleeping rooms raised at least ten feet from the ground, as malaria rarely rises above that height Several officers and overseers had lost their health mainly due to the position of the bungalows—Colonels Michael, Hamilton and Beddome, Messrs. Gosling and Douglas and many overseers. At Nellumbore it was the same, the bungalow was in a low place, though there was a hill some three hunderd feet high a short distance off. I strongly recommended a good bungalow on the top. The difference of temperature alone in in that sweltering climate must have been at least six or seven degrees, to say nothing of a healthy breeze. Too much importance cannot be attached to the situation of the forest residence it should always have a sleeping apartment, at least ten feet aboveground.

* * *

There are streams near Gooloor Hill in Beni, on the Survey Map, which lead into the "Nogo" river, from thence into the Cubbany River to Nungengode; these streams might be utilized for floating, especially if a large plantation of a thousand acres was made there. I planted sixty acres at Beni, and the growth of the trees was good. It is a fine site for a

large plantation, the soil is good, the slopes are easy, the hills carry fine timber. Blackwood also grows well on them. As mostly all our timber had to be carted up to the Nilghris for public works, it was not thought advisable to open up the floating capabilities of these streams, but as Madras offers such a good market for Teak and the Mysore Railway is open, it is time to look to that city for a market. The same may be said of the Anamallies and Nellumbore. The floating on the Nellumbore river should be put a stop to I wrote some eight years ago, recommending that a steamer, towing some four or five flat twenty-ton boats similar to those in use on the Buckingham Canal, should be used. The voyage from the further parts of the plantation to the Railway Station at Beypore would not take more than ten hours, and the boats sould be towed back in the same time. The cost would certainly be less than the present charge which is about two annas a cubic foot. The present system is a most pernicious one. First, bamboos which are scarce have to be cut, and stored at a great expense of time, money and labour, and where labour is required for other work, the diverting of it, is at the expense of the plantations. Having collected the bamboos, they are made into a raft; on this the teak logs are placed, and a half flood chosen for floating—for if you float in a full flood, and your raft goes ashore, it must be taken to pieces as no power of elephants can push it off. Then the river, a narrow one, is blocked by numerous rafts, thefts of timber are common, the lashings are cut loose, the marks erased, and the owner vainly seeks the aid of the Police. The rafts frequently take three weeks to go Beypore, sometimes they are left high and

for months; in fact the confusion is endless. A steamer and a dozen twenty-ton boats would put a stop to all thefts.

Steamer and boats.

The timber would be carried cheaply and expeditiously; the river would be always clear. If the steamer only worked for three months, carrying two hundred tons at a time or four thousand tons a month, the whole of the timber of those forests could be carried to Beypore with the greatest ease in two months. Moreover, there is, at times, a great scarcity of bamboos for floating timber. Teak, green, weighs over 60 lbs. per cubic feet and averages when dry 47 lbs. To leave it to dry in the forest, renders it liable to be stolen, as there are many private forests, and timber-stealing is very common. In 1874, when inspecting some new land, I had just bought for Government from the Amrapollium Rajah, I caught three elephants in the act of dragging some Teak across the river in open day. It is true, they did not expect me to appear in that particular part of the forest. The Rajah of Nellumbore conplained that the Moplas dived under his rafts, moored in front of his house, cut the lashings at nights, and floated the timber away, He was advised to use chains, and he did so, and lost no more timber at his depot; but on the voyage down to Beypore, he had to pay Black Mail. So long as the Anamallies supplied timber to the Bombay Dockyard, it was floated to Ponani by river, but to send it to Beypore now, would be to compete with Nellumbore timber. For this reason it is preferable to send it to Madras where the consumption of Burma timber is very great, and the price high.

Shoots: Slips.

I am not aware that any of our forests require shoots or slips; the plan of a slip is laid down in "Reports on Forest

management in Europe, by Colonel Campbell Walker." On visiting the Anamallies, in 1860, I was very much surprised to see what was called "a slip," which consisted of an inclined road about one in two, worn into large hollows. Elephants slipped the timber; when it lodged in the holes worn by rain they had to lift it out again; thus the work instead of being simple and easy, was very laborious and expensive. The slip is no longer used, as a road at an easy gradient has been made and the carting is done at one-half the cost of the slipping.

I observe that in my Forest Report for 1872, at page 62, I calculate the cost of slipping at 1.3 per cubic foot. I am certain the carting can be done for about one-half. Some years ago a number of trees on the Anamallies were girdled with a view of seasoning them standing, as was done in the Burma Forests; it was not found to answer, for, when felled, the wood was found to be brittle, to have lost all its oil, and the saw-men could not get a plank out of a log; of course, the system of girdling was abandoned. In 1862 the Admiralty sent out to India to enquire why Burma timber was so dry and brittle, whilst Malabar timber was full of oil and very tough. The papers were sent to me asking if the trees had not been tapped for oil, and I answered them to the following effect: "That Malabar timber was always left on the ground to season, lying in a horizontal position, so that all the sap and moisture was evoporated out of the log, whilst the oil remained, that the Burma timber was girdled and left standing for two years, that in consequence of this vertical position of the log, not only was all the sap drained away, but through the tubes all the oil was also drained away. That there was no reason

why Burma Teak should not have as much oil as Malabar Teak if treated in a similar manner.

Girdling. The advocate of girdling in Burma stated, "That as the timber had to be floated, it was necessary to leave it girdled for two years to reduce its weight. That if the timber were felled and left lying on the ground, it would infallibly be burnt as the area of the forest is so great that they could not afford watchmen to look after the felled timber." They did not seem to be aware that their system reduced the value of the timber by 50 per cent. I am of opinion that it would have been better to have formed large depots and watched them, or to have put the timber on board flats and have towed them to the port.

Floating. As for rafting, it may do in some places like the Rhine where there is only a down traffic and a very broad river; but in many rivers, rafts interfere with the traffic, and it is a question, if there is not a saving in putting the timber on board flats and tugging them to their destination. One thing is certain that Burma timber is dry and brittle, and by no means so strong as Malabar, and the cause is the loss of oil.

In condemning rafting on certain rivers such as Nellumbore, I do not for a moment deny its utility on small streams, and on the Cubbany, and possibly other rivers where steamers cannot ply, in fact Wynaad timber cannot be got out to Mysore without floating, except by very expensive carting. In rafting it is advisable not to square the timber but to leave it round.

HABITS OF THE TEAK TREE — It has been stated that "perfect drainage and a dry sub-soil" are absolutely necessary for the health of the Teak tree, (page 356, Brandis' and Stewart's "Forest Flora;") now I have found that the Teak delights in a moist clayey sub-soil. All over Wynaad, Anamallies, Nellumbore, it will be found that the Teak grows best in a brown surface soil, having yellow clay as a sub-soil, the powerful roots of the Teak soon procure drainage for itself. If by perfect drainage is meant that Teak will not grow well in swampy situations, then the remark is correct; but I cannot agree, as to the preference of Teak for granite soils, in fact, nearly the whole of our sub-soils consist of decomposed felspar which are decidedly clayey in their nature. It is true that at Nellumbore, the largest trees are seen on the banks of streams whose sub-soil is very free, but even then the clay predominates over sand, and the tree rejoices in a loose soil with plenty of moisture in it. Here we never find the Teak associated with bamboo, in fact, it is well known that Teak will not grow under bamboo. Wherever Teak is found with bamboo, it will at once be apparent that the Teak is older than the bamboo; Teak is found at the sea-level like Nellumbore, on the Anamallies 2,500 W., and in Wynaad up to three thousand feet growing well. Teak may be found on light and sandy soils, certainly not in Southern India. Teak does not live on humus, but on clayey sub-soils. I have known that it is not "fire and early rains" that prevent seed from germinating, but rats and squirrels.

* * *

The white sandalwood is a native of Malabar on the hills of which it grows as a large tree. It is also found in

Coimbatore, Mysore, Canara, Salem, Madras, &c. Mysore produces the best Sandalwood, two kinds of the wood are procurable in the market both being the produce of the same tree. The white Sandalwood comprises the outer layers of wood, is hard, heavy and susceptible of a good polish. The yellow and brownish wood is obtained from the heart of the tree, and is the most valuable and best esteemed. The heart or heavier wood comes chiefly from the lower parts of the stem, is strongly scented, hard, takes a good polish, and is well adapted for carving, turning, &c., and is easily cleft. The odour is strong and enduring due to the presence of an essential oil. The scent is dependent chiefly on the soil, and the elevation at which it grows; a third kind of Sandalwood or Saunder's wood, or red Sandalwood as it is called, is met with in the market, the produce of the Pterocarpus Santalinus belonging to the natural order Leguminosæ and produces a valuable dye, and takes a fine polish.

* * *

Sandalroots parasitical.

There is another reason why sandal thrives with nurses; it is semi-parasitical being next in natural order to Loranthus, in its habit, and the roots seem to grow best on other roots—like the Orobanche the seeds of wich will not grow unless their roots can be attached to the roots of another plant.

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Minerals for trees.

A chemist for the departhet is more urgently required than a botanist; One thing is almost certain, that trees require minerals to develop their special qualities more than humus or nitrogen.

* * *

Hedge row timber.

In Mysore wherever villages were distant from the forest, they cultivated hedge row timber in the shape of Neem Babul, &c., &c., It surely is no hardship that if a village has dertroyed its own small forest, it should be made to renew it and not indent upon forest that belongs to the country, and to which they can have no possible claim.

* * *

Acacia Melanoxylon.

Introduced by Colonel Dun.

This tree was, I believe, introduced by Colonel Dun to these hills about the same time as A dealbata; there were a few in 1845 in his compounds and some in the club grounds. They were still so rare in 1851, that I remember some just planted were stolen from General Watson's ground and were traced to a private gardener where they had been brought as a peace-offering, and up to 1857 the Government charged four annas for a plant. Last year I cut down a tree in my ground that had been planted before 1845 or about thirty-eight years of age. Though it had a large hole in it from which a hive of bees had been cut out, it gave sufficient planks to board a large room 24 x 15 of excellent wood; indeed so much is this wood esteemed it Australia that furniture is largely made from it. Here, I regret to say, it is mostly used for firewood, it does not burn green like A. dealbata, nor does it produce so much tar, but is yet an excellent firewood. As far as I have observed the tree seems to flower and seed all the year round. The flowers are inconspicuous, but the seed pods at times cover the tree. It is a very valuable tree. and should be cultivated more largely. It does not grow as fast as the

Its uses.

Eucalyptus nor is it so tall, but some trees that are forty years old contain at least fifty cubic feet of good timber; as a rule, it makes black heartwood in a similar manner to our Dalbergia latifolia.

* * *

When Vengay was selling in Madura at 1-8-0 per cubic foot, Teak was bringing but one rupee at Calicut. At Palghat, merchants ask now Rs. 2-12-0 per cubic foot, while at Calicut, timber (Teak) is sold by Government for 1-8-0, and at Ootacamund for two rupees per cubic foot,

* * *

Jungle-fever invariably breaks out on the thirteenth day counting from the first night of sleeping in the jungle, and if precautions are taken within the thirteenth day, such as an aperient dose followed up by five grains of quinine a day or two previous to the thirteenth day, the fever, if not averted, will be very much modified. Sleeping in musquito curtains will be found an excellent safe-guard. Natives invariably cover their faces with their cloths when sleeping which acts in the same manner, viz., by preventing the entrance of malarious gases-on the same principle as the safety lamp of Sir Humphrey Davy. The Italian Doctors have lately discoverd that in the blood of the fever patient, there are numbers of infusoria which were destroyed by the taking of quinine.

I have sometimes had as many as twenty bandymen in a row taking emetics, and all my work stopped.

* * *

I never drank jungle water; if very thirsty in the pursuit of elephants in the hot weather, I chewed the fruit of "Nellekai" (Emblica Officinalis), a fruit which looks like a large green gooseberry in clusters on the trees. Astringent at first, it cause a flow of saliva and sweetish taste. One hot morning, in April, I was informed that a large herd of elephants had beset the cartmen and interrupted their work; everything was at a dead lock; so, to stop this state of affairs, I sallied forth at sun-rise, and an hour or two walking, brought me into the centre of the herd, numbering some sixty or seventy; by one O'clock I had run the herd to a standstill, and had slain three tuskers, the ground underfoot consisted of ashes, as the grass had been just burnt, the swallowing of these fine ashes added to the heat of the weather, and the exertions requisite to follow the herd, were such as to create a thirst of no common kind, and yet on a bottle of tea, and two or three "Nellekais," I walked back to camp, feeling none the worse for my exertions. I have often, on the hills, in a blazing sun, in January, tried the effects of cold water from a purling stream, the more I drank, the more I desired to drink, and no amount seemed capable of quenching one's thirst; indeed I may say that weak tea, with lime juice (if it is warm so much the better), is the only drink capable of assuaging a raging thirst.

The Forest Officer has not time to train men in this Department, nor has he any appliances, whereas they may all be found in the Ootacamund gardens.

Colonel Beddome, in his Forest Report for 1869-70 page 44 mentions a small area of superb Teak, nine feet in girth and sixty to so seventy feet high.

Black wood Dalbergia Latifolia

This tree attains a vast size on the Anamallies, Wynaad, and the slopes of the Nilghiris above Nellumbore, planks three feet in diameter are not uncommon; it is considered by the natives to be stronger than Teak.

* * *

Notes on Eucalyptus globulus.—This tree was planted at Ootacamund by General Fred Cotton, then Captain Cotton; about the year 1843, there was one in the ornamental sholah at Gaton then his property, and there were three trees in his woodcote.

In 1852 Mrs. Morgan drew my attention to the seeds of a tree at Colonel Havelock's house; this was a species of Eucalyptus; we raised about four hundred plants from its seed, and finding the growth extremely rapid, about ten feet a year, I was induced to obtain a quantity of Eucalyptus seed from Australia in 1856, and in a short time raised over one hundred and fifty thousand plants, and distributed them all over the hills. So rare were the plants that even in 1867 the Government Gardens priced a plant at twelve annas. In 1862 Sir William Denison, the then Governor, seeing how successfully the trees grew, ordered some Government land to be planted, and this was the commencement of planting on a large scale.

The Eucalyptus has been credited with keeping off malaria in marshy places by the aromatic scent of its leaves; this is only partly correct, for the fact is that the tree having very powerful roots, pierces through the bed of clay that retains the moisture, and thus drains marshy lands, for the water descends to a lower level. I have, on these hills, seen small ponds and streams dried up where Eucalypti have been planted. In many parts of Italy where Pinus Maritima has been planted, the ground has been completely drained, and the malaria banished. At Arcachon, in France, there was a very considerable tract of land, full of marshes, with stunted Oak, Beech and Elm growing, the place was the resort of snipe and woodcock. The trees were cut down, and the whole planted with the turpentine yielding fir, the result was that the ground was completely drained, and the place become a sanitarium for invalids. In Algiers the planting of the Eucalyptus has, in numerous cases, banished malaria by simply draining the land.

Eucalyptus Globulus.

The tree is of very great use here for ordinary building purposes, the thinnings at eight years of age makes excellent rafters and wall plates, nor do they easily decay if the bark is kept on and the wood protected. Planking from older trees lasts fairly well, if not exposed to damp, but this is no test as we have no timber so to speak; the oldest trees being only twenty-five years old, and nothing being considered timber under forty years. I may here observe that by steeping the planks in a tank of water which contains 1/600 part of lime, the durability is much increased. There is no necessity for putting more than one cubic foot of lime to six hundred cubic feet of water, as no more lime can be taken up by the water;

Of the wood as timber.

the theory is that the water forces out the sap and deposits lime in the capillary tubes.

Eucalyptus varieties.

In the year 1862 I obtained a large variety of Eucalyptus from Australia, none of the Jarrahs succeeded, it being too cold for them, but the red gum, Eucalyptus rostrata, has done well, it is reckoned a most valuable timber in Australia; it is nearly allied to Jarrahs; Eucalyptus amygdalina also grows well — this tree is reported to exceed even the Wellingtonia Gigantea in height, trees of nearly five hundred feet in height having been measured. The grain of Eucalyptus Globulus is similar to that of the Ash.

* * *

Some years ago, (Forest Report, 1861-62,) I compared the growth of the Eucalyptus with Teak at Nellumbore and Oak plantations in England, and found that Teak grows twice as fast as Oak, and Eucalyptus twice as fast as Teak.

* * *

The wood when ten years old is good for all kinds of rafters used in building; when twenty years old, it is fit for flooring planks, rafters, reepers, &c., when forty years old, it may be considered to be timber and has been used for ships, spars, &c.

* * *

One kind of tree invariably consumes all the food in its vicinity required for its special conditions. This is well exemplified in the Teak plantations at Nellumbore, where

occasionally a natural Teak tree is observed to have been enclosed in the artificial Teak plantation; for a radius of thirty feet all the young Teak languishes and refuses to grow, but should a blackwood tree have been enclosed, the young Teak near it flourishes and does not exhibit any appearance of poverty.

* * *

The only possible way in which soils exhausted by koomaree cultivation can be restored is to put an entire stop to it. If the mischief has proceeded so far that reboisement is necessary it should be taken in hand at once, and the areas requiring it planted up with such descriptions of trees as suit the climate and locality, and are likely to bind the soil with their roots. For high elevations the Acacia dealbata answers excellently for this purpose. Some species of Ficus are also very good, especially those that throw out an abundance of aerial roots are suited for low elevations. It may be contended that the aboriginal tribes have practised the koomaree system of cultivation from time immemorial—that it is impossible to put a stop to it. There is considerable truth in this; but the word impossible in this instance should form no part of the Indian Forester's vocabulary. To suppress the practice will take years and years. The aboriginal tribes must be found some other means of employment. They must be civilised. Lands must be set apart for them and permanent villages built. They must be encouraged to plant fruit trees and grow other crops than those they have been accustomed to. They must be taught trades and stimulated to practise such as they engage in at present, e. g., the manufacture of pottery, of basket-work

and the art of the blacksmith. Congenial employment must be found for them by the Forest Department, such as timber squaring, the collection of forest produce, &c., and deserving men should be employed as watchers, elephant-drivers and maistries. They can be made of the greatest service to the Forest Department or the reverse, as they happen to be treated; at present, they are aliens and out-castes, swindled by everybody and oppressed by every peon and policeman in the country. How can the Kurumber be expected to rise in the scale of civilisation when he dare not possess property? If he invests in a few fowls, sheep, or goats, the first peon who happens to see them will at once appropriate them to his own use. If he grows vegetables, they too will be stolen from him and the unfortunate owner most probably be made to carry them to the house of his despoiler. Dare the wretched man complain he is kicked and beaten. This picture is not over-coloured in any way. It is what actually occurs in every forest and almost every day.

The Senior and Junior Division tour.

(November and December 1919).

The end of October 1919 announced to the Students of the Madras Forest College that it was high time for them to put their theoretical tution into practice, and the beginning of November was very eagerly expected. The day however came when the Juniors started to Nilambur and the Seniors to Komattiyeri with their instructors. The Seniors started on the 2nd November and reached Alangayam the head-quarters of a range of that name, on the 3rd. Thanks to the arrangements made by Mr. Cornwell, the officer in charge of the Senior Da. Camp, the students were comfortably putup in a choultry arranged for the purpose. Mr. Parthasarathy Iyengar, late student of our College, and the Range Officer, Alangayam, did all that he could to look to the comforts of the students in that out-of-the-way place. The thanks of the students and the College are due to him. The students halted there on the 4th, and were practically shown how the different range registers, especially accounts relating to timber, should be maintained. By the break of next day all the Senior Da. students walked to Komattiyeri along the newly made "Gillman road" for 14 miles. Before this road was laid, much difficulty was felt. Now the heart of the 'Javadis' is open to all. The principles of a hill road construction and the necessity for culverts, and bridges were clearly brought home to the minds of the students. The students are thankful to Mr. Cornwell Senior Engineering Instructor, for having, very shortly, explained to them the outstanding features of construction of this road.

The first few days of our stay were rainy, then the season was anything but enjoyable. We were comfortably put up in our tents on a big maidan permanently acquired by the College for the purpose. The mornings were spent in excursions to the valuable sandal areas and the evening was spent in playing Cricket, or Foot-ball, for which we have enough space. The ground requires a few improvements. During our stay at this camp which lasted till the end of November, we studied sandal thoroughly. Its root parasitisim was examined and determined. The experiments conducted by Rao Sahib M. R. Ry., K. R. Venkatramanier avl. the D. F. O. of that division to see whether sandal is an

obligatory parasite were shown to us and explained, and so far it does not seem to be an obligatory parasite but it is too soon to give any decided opinion in the matter. We were much benefited by examining the manifold experiments conducted in bamboo areas to find out among others the longivity of a.culm, the right season for filling bamboos and the distinguishing characteristics of bamboos of one, two and three years old. We were taught the principles of the "Village Forest System" which is being admirably worked here. The principal object of the system here is to protect the valuable sandal areas, ruined in the past, by securing the willing Co-operation of the Malayalee's here with unscrupulous Sandal dealers. The scheme so far has attained success here which seems to be mainly due to the sympathetic attitude of Government generally, and of Mr. Venkataramana Iyer, the D. F. O. in particular; in our history 8th November '19 is an eventful day as we had the rare fortune of being present at a 'Durbar' held by the conservator (Mr. Latham) of the southern circle at Komattiyeri when all the 'Oorans' were present to represent their grievances, and take the advice of the authorities concerned. Those who successfuly protected their forests under the "Village Forest System" were rewarded freely. The principles of the system were explained *in extenso* and at the end a group photo with the 'Oorans' were taken.

For a period of our stay here our Principal also stayed with us and was always on the look out for the progress of the students in all directions. We are thankful to Mr. T. D, Ponniah, Range Officer, in charge of Polur, a late student of the College for his very kind attention to the convenience of the students. Though the 'Javadis' are ill-reputed for fever none fell ill continuously, a few of us had one or two days fever only. After we left the Javadis we stopped for a day at Tirupat tur, and studied the cleaning, stocking and booking of sandal, Mr. Manickam Pillai in charge of the Range looked to the comforts of the

students and arranged for a special commodious building for their stay there for 2 days.

The students then proceeded to Nilambur, where they stopped till the 18th December '19, when they broke for Christmas. Here they had a comparative study of teak plantations of 1917, 18, & 19 and the thinned, and unthinned areas. Here they had their practical examinations for a few days.

While the seniors were thus engaged at Komattiyeri, the Juniors had their practical course of instructions at Nilambur where they were comfortably put up in the spacious compound of the Nilambur Dt. Forest office; on their way to Nilambur they stopped at Calicut for 4 days and visited the Kallai saw mills, Govt soap Factory, Henkes' tile factory, Fish canaries, and the Beypore Timber Depot. They visited the different teak plantations, and learnt about weeding and thinning. They visited the Edavanna rubber estate where they were told about the preparation of rubber from latex. Practical demonstration in foundation digging and construction of laterite walls in addition to anchoring the wire rope for a 'boom' across the Nilambur river, was given in Engineering.

When the seniors went to Nilambur the Juniors shifted their camp to Nedungayam. There, they had the opportunity of visiting a natural forest and how areas selected for teak plantations should be dealt with, most of the areas here under plantation, being first class areas; the principles of thinning them were also taught They also built a substantial 'Trestle bridge' which the seniors saw subsequently. They too broke for Christmas about the 18th December 19.

The principal was with the college for a month at Nilambur. Messrs., Swami Kutti and Rowland spared no effort to render our stay

comfortable and instructive. When we compare what we have heard of the experiences of earlier years in other districts we realise that our grateful thanks are due to these two officers and their thoughtful care.

T. M. Doraisamy Pillai,

24—2—1920.

A pleasant evening at Kargudi.

The Students of both the divisions of the Madras Forest College were 'at home' to Mrs. Cowley Brown, Principal and Staff and to Mr. Govinda Menon the E. A. C. in charge of Mudumalai Range on the evening of the 4th February at the joint camp at Kargudi. The following programme was successfully gone through. Student A. R Manuel of the Junior Division opened the function with a song which was very much appreciated. Student P. Sankunni Nair then performed 'Thought Reading' very ably which brought forth outbursts of laughter. Recitation formed the next item in the programme and T. M. Krishnamachari did full justice to his part. The anxious expectations of the guests and students were pacified when B. S. F. Lebbai of Ceylon, a Junior Division student, entered the stage with his 'Subject', A. Rama Rao of the Senior Division on a cot in Mesmeric sleep. The subject's body was lifted and placed on two chairs one of which supported his head and the other his feet. It looked as though a log was kept supported at the two ends. Weight to the extent of 150 lbs was applied on the stomach of the 'Subject' but it never yielded. Various were the wonderful items performed not excepting the one in which a pin was pierced through the skin; the 'Subject' obeyed the will of his

control without hesitation and murmur. When Rama Rao was brought back to his senses many sympathatically examined his arm whether the driving of the pin left any mark and drew blood. Nothing was found. The guests congratulated the young Mesmerist on the very successful programme he went through.

During a short interval the guests were treated with light refreshments and tea. The interval was broken by a short lecture on 'Moral Philosophy' by student Parameswara Iyer. And then followed a Sindhi Song by C. K. Gulrazani which was appreciated by all. Palanikumaran amazed the whole audience by his conjuring. Many were the card tricks which he performed and the audience tried their best to defeat him. But he yielded to none and all his tricks were quite successful and bewildering. To his credit it must be said that his quickness of hand amazed and duped all. The evening programme was wound up by the enactment of a short farce entitled "Fashion of the Day" by Senior Division students Abdul Rahiman, Abdul Rahimkhan and M. P. Subbiah. It was very witty and humourus and the guests enjoyed the fun fully.

After the end of the programme our Principal congratulated the students who made the evening programme a success. He also observed that the occasion gave him a rare opportunity to learn the talents of the students and that he and his follow guests were delighted with the kindly hospitality of the Students.

T. M. Doraisamy Pillai.

The elephant capture in Mudumalai Range.

The experience of the 30th January 1920 will never be forgotten by the students of both the divisions of the Madras Forest College. While both the divisions were engaged in their usual morning avocations in the field, information was received at 9-30 A. M. that two elephants were got caught into pits, one a tusker of 5 or 6 years old, and the other a cow-elephant of between 1 and 2 years. Both the divisions stopped work, and were ordered to the spot 4 miles away from the camp to see the release of the elephants, so as to have first hand information. The eagerness of the students knew no bounds. All were at the spot in time. The occasion was graced by Mrs. Cowley-Brown and the cow elephant was christened after her as *Cecilia*. The tusker was named Henry after Mr. H.Tireman, the conservator of the circle, who joined the merry group when his god-child was taken for being enkraled. All the Instructors, including the Principal were there to see their rescue.

Pitting and Watching for capture of elephants:

Pits 12 to 15 feet square and from 15 to 18 feet deep with the sides almost vertical, are dug up in places resorted by elephants. In most cases, these places adjoin streams, the idea being that elephants which go for drinking water may fall into these pits. The pits are covered with mats spun out of split bamboos, and these are then camusflaged with a layer of mud and dried grass. The pit all round is so covered with grass so as to give an undisturbed appearance that the elephants may not suspect any evil. In certain places, sugarcane,

kambu and cholam are cultivated around the pits to invite the elephants to the spots. Pit falls do not occur always but only during a certain part of the year known as "elephant capture season". This is a season of scarcity of fodder and water, when pits are dug up in places where the elephants are likely to go in search of them. The pits where in our captures have fallen adjoin a stream which is said to be perennial. There is also good growth of grass all round. The number of pits dug up vary according to the locality. Here more than a score of pits were dug up and these are watched twice a day by a man specially appointed for the purpose. It so happens that other kinds of animals such as bears, samburs deer also fall. These are removed from the pit, let off, and the pits cevered as usual. When there is a pit fall of elephants information is immediately given to the Range Officer, and Jamadar who make arrangements at once for the removal of the fallen ones.

Its state in the pit:

The ferocity of an elephant when entrapped in a pit may be better imagined than described. Soon after fall, they become restless and ferocious and the state of the pit vividly shows their action. In their anxiety to escape from the pits and join the herd, from which they separated, they run this side and that, butting with their heads and tusks and legs and scratching the sides of the pits by their tusks and teeth. But of what avail are these before the ingenuity of man! They tire themselves and yell out for help, perhaps, but without any hope.

How they are noosed and taken out of the pit:

For taking an elephant out of the pit, 2 ropes, 4 tamed elephants, a lot of billets and some experienced men are necessary. The ropes are of hemp and are strong but soft. The rope for the neck-noose is about 2" in diameter. The other for the hind leg is a little smaller. The thicker end of the big rope is folded to about a foot or more and tied strongly so as to form a loop. According to the size of the elephants' neck, a noose is formed and that it may not be tightened in the effort, and the elephant strangled thereby, a piece of wood about a foot long is passed across into the rope, and tied so as not to allow the loop to tighten. The place where this piece of wood should be tied is often learnt by experience by looking at the size of the neck of the elephant by the Jamadar. From the extreme end of the loop this guessed length is measured out and the piece of wood tied there. Another rough method to find out the circumference of the elephants' neck, is by taking it at 7/8th of the height of the elephant measured to its withers. The next thing to do is to slip the noose on the elephant's neck Its trunk is a great impediment and the elephant should be made to raise its trunks high. For this purpose a long piece of cloth is drawn before the eyes of the animal to irritate it. It is also proked from behind by means of long bamboo poles. Infuriated at all these jokes for which it is not prepared, the elephant raises its trunk to catch the cloth. All this time the noose is opened broadly and kept ready by 3 or 4 men and slipped on its neck, when it raises its trunk. It is very rarely that first noose catches the neck of the elephant and it is repeated till it is properly slipped. When done properly it is tightened by briskly drawing the other end of the rope and fixed to an adjacent strong tree. Then comes the securing of the hind leg. A noose, as already explained is made but

without any piece of wood to prevent tightening, as no harm is caused by any amount of tightening of the leg. The noose is opened out and thrown into the pit and the elephant is poked and disturbed to move hither and thither. Its movement being watched when it perchance lets one of its hind legs into the noose, it is tightened and secured to a tree. Owing to the irritation caused, the elephant sometimes, shows signs of tiresomeness by not heeding to any poking. To refresh it, cold water is poured from above on the animal's head and back. It remains that the neck noose should be fastened securely so that it may not slip and the elephant bolt away when taken out. The animal is now within the pit and it should therefore be brought within the reach of man but not so far above that the animal may come out. Logs of wood are slowly and carefully thrown into the pit, so as not to hurt the animal and as the pit is thus made shallower and shallower, the elephant comes up and the neck and leg ropes are tightened. When it is within reach from above a man fastens the piece of wood and the loop firmly. This man lies flat on his stomache with half his body away from the edge of the pit, and a cloth passed round his stomache together with his legs, are carefully held by 3 or 4 men so as to draw him away when the elephant turns towards him. This is one of the dangerous things; and the men holding him will have to be all the more careful. After the noose is securely fastened there only remains to get the elephant out of the pit. Some more logs are thrown in and 4 tamed elephants are made to stand very near the edge of the pit to check the new one on coming out. The neck rope is taken charge of by one of the elephants and 'Jupiter' did creditable work in this and various other directions. More billets of logs are thrown in, and the captive makes an effort to reach the top. Just as it reaches the top, the neck rope is instantly taken charge of by Jupiter and the captive is out and checked from running. Two more elephants come one on each

side and a third goes in front and bars its way. If the captive behaves rudely, the tamed ones butt it. It is thus again a captive in the mids of elephants.

Enkraalment.

The neck rope is passed round the belly of one of the trained elephants and properly secured; so also the hindleg rope on another elephant. One elephant leads the way and the fourth pushes the captive from behind when it makes any mischief on the way. Our *Henry* was very naughty on his way and laid down in places. After so many difficulties, it was taken to the stream for a bath and to drink water. Here again he gladly went into water but would not come out till he was forcibly pushed by the veteran jupiter. By this time a solitary cell (kraal) was made ready in the elephant camp near by and *Henry* was led into it by kamala by about 2 P. M. and the bars were carefully drawn after kamala came out. Being separated from its kind, *Henry* butted and kicked the bars around its cell, only to get injuries on the forehead, legs, and trunk. It even climbed up the crosspieces, only to fall back. After enkraaling, the neck and hind leg ropes were taken out, (rather a dangerous job) by the Jamadar Gopala Rao, whose work was indeed very commendable.

In the same way Our other Captive *Cecilia* was also taken out, brought and enkraaled, at 5-30 P. M. We are thankful to these elephants for the time chosen by them for their fall and praticularly also to Mr. Govinda Menon, the Extra Assistant Conservator, in charge for having sent us the information and waited till we reached the spot and thus given us one of the rare opportunities.

Those of us who had experience in such matters were of opinion

(i) that to ensure the safe entraction of the animal more billets should have been put into the pit.

(ii) the Elephant 'jupiter' and his mahou, Chattan saved the situation by masterly combination and presence of mind.

Compare the strength of man to that of an elephant; yet man has subjected it by his ingenuity.

Camp, Kargudi. T. M. Duraiswami Pillai,

Asst. Editor 31-1-20.

Notes on some exotics.

(grown on the Nilgiris at "Downham", Mr. Oakes' property near the head of the Sigur Ghat).

Betula alnoides: a line of 5 or 6 trees grown from seed obtained from Assam. Age 10 years, Height about 40 feet, girths appeared to be from about 3' 6" to 1'2" (Eye estimate). A pretty tree.

Auraearia Excelsa. (Norfolk island pine) grown from a plant supplied by Mr. Crumbiegel, Government botainst, Baroda. This specimen was planted in 1906 and is now about 25' high.

Juglans nigra. (English Walnut.)

Quercus incana. (A Himalayan Oak), grown from an acorn sown in 1910. 2 trees of girth about 1' 8" and 1' 6" (Eye Estimate.)

Quercus Griffithi. (Himalayas) sown 1902.

A *Juglans* species from the Shan States (Burma) where it is said to grow to 6' or 8' in girth and to give a beautiful wood.

Camphora officinalis. (Japan), seedling obtained from Mr. Colin Mackenzie who planted 100 acres or so in the Wynaad near Cherambadi. Mr. Mackenzie I believe got the tree to grow allright, but manufacture of the camphor was the difficulty. The timber is good for boxes, especially for receptacles for clothes, as no insect will go near it; Camphor boxes fetch a good price. Mr. Oakes sold one lately for Rs. 25 at auction.

There is said to be a specimen of Camphora officinalis in Government House Gardens, Ooty, near the lower glass house.

(Officers trained at Dehra will recollect the fine avenue of camphor trees leading to theBotanical garden. Ed.)

Vitex littoralis. (sometimes called New Zealand Teak.) A specimen sown in 1915 is now about 15' high.

Mr. Oakes who spent some time in New Zealand says it is regarded as one of the best New Zealand timbers.

Quercus suber, the cork oak of South Western France and of Spain. This tree grows allright at "Downham" but is attacked by an insect. Mr. Oakes has a specimen cut from a tree sown in 1906 and felled in 1917. The specimen is a length of the bole about 5 feet long and shows the virgin cork. Mr. Oakes would be happy to present it to the Forest College Museum, if required.

I inspected Mr. Oakes' trees at his kind invitation, to see whether the Forest Department might profitably experiment with any of the exotic tree species planted by him. Perhaps *Vitex littoralis* and the *Juglans* from the Shan states might be tried by the Department on the Nilgiris.

Possibly *Betula alnoides* would be worth trying along the trout streams, where shade is much required. At present the viminalis willow is being put out for this purpose.

J. H. LONGRIGG,
24 - 12 - 19.

Occasional Notes.

Mr. R. S. Troup (late Assistant Inspector-General of Forests) has been elected to the Forestry professorship at the University of Oxford.

* * *

We are glad to note that the following names of Officers of the Forest Department appear in the New Year Honours List.

Knight Commander of the British Empire.

George Sankey Hart, Esq., C. I. E., Imperial Forest Service, Inspector General of Forests.

Commander of the British Empire.

Peter Henry Clutterbuck, Esq., C. I. E., V. D. Chief Conservator of Forests, United Provinces.

Officers of the British Empire.

Harry Richard Blandford, Esq., Deputy Conservator of Forests, Burmah.

Miscellanea.

In the Forest Service of France, there are about 600 Gazetted Officers. 87 were killed during the war.

* * *

A truly level line is a curved line, every point of which is equidistant from the Earth's Centre: *i. e.*, it is parallel to the Earth's Curvature.

A horizontal line is a straight line tangential to the Earth's Curvature.

* * *

A climber for bare walls.

The climbing organs of a species of Bignonia (Bignonia gracilis, *Lodd*; B. unguis-cati, *Linn*—Cat's Claw Trumpet Creeper) introduced from South America, and tried on the walls of the Gass Forest Museum deserve special attention. Below each node a pair of adventitious roots (similar, in function, to the adhesive discs of certain species of *Vitis*) serve as very strong holdfasts by secreting a gummy substance, which cements the Climber on to the support, however smooth the latter may be.

The leaf is a pinnate one, with only the lowermost pair of leaflets foliaceous, the remaining three being modified into *hooks* (hence, probably, the popular name of the species) which serve to further fasten the plant to the support. With the help of this climbing mechanism the plant is able to climb up a wall without any trellis, and a trial on bare walls, is being made.

G. V.

History of a stray sandal seed.

A sandal seed dropped by chance near the stone steps of the Gass Museum germinated successfully, and has managed to flourish, (and continues so) for a period of about *three years* with probably nothing but a *short length of Eupatorium hedge* hard by, as its host. It is now nearly 7 ft high with a maximum girth of 9 inches.

It is interesting to note that (1) about 5 ft length of the host hedge has now nearly died having, evidently, been robbed of a greater quantity of nourishment than the slender resources of the hedge could afford, and (2) the Sandal leaves are getting yellowish.

How not to do it.

A Forest Guard in the north of the Presidency was told to sow broad - cast 6 bags of sandal seed that had been obtained at considerable expense from the Javadis. The operation was duly reported and paid for as "completed." A little later the Conservator was inspecting that Forest and observed that there were no sings of Sandal regeneration. But on going into a temple near by he was surprised by the sight of the Forest Guard prostrate before the God and swathed up to his neck in sandal seed—the contents of the whole six bags: the Forest Guard's object doubtless was to invoke the favour of the local Deity in appeasing the possible dissatisfaction of the Ranger with a lively sense of fovours to come.

* * *

Timber suited for Casks.

Dysoxylum glandulosum is considered the Indian Cask-timber par-excellence for the export of Cocoanut oil to Europe. In Malabar it is extensively used for manufacturing Cocoanut oil Casks.

According to the Assistant Forest Economist, the condition of sample barrels made of different timber species under test, indicated that satisfactory results may be expected from *Adina Cordifolia*, *Grewia tiliaefolia*, *Dillenia indica*, and *Odina Wodier*.

Terminalia tomentosa, and *Anogeissus latifolia* experimented with, in United Provinces are also reported to be quite suitable for the purpose.—(Extract from "Report of the Forest Research Institute" Dehra 1918—19)

List of books received for the College Library during the quarter ending December 1919.

1. P. W. D. Code with appendices (10th edition). ... 1
2. Ceylon Administration report 1918. 1
3. United Provinces Administration report 1917—18. ... 1
4. Indian Industrial Commission. Minutes of evidence 1916-17; Vols. 1 to 5 with list of witnesses. 6
5. Proceedings of the Government of Bombay April 1919. ... 1
6. Mr. Andrew's Conference with the publicity Board regarding Ceylon labour ordinance. 1
7. Working Plan of the Ramnagar Forest Division Western Circle United Provinces. 1
8. Working Plan of the Tikri Reserve Forest in Gouda Forest Division, Eastern Circle, United Provinces. ... 1
9. Western Australia Report for the Forest Department for the year ending 30—6—19. 1
10. Mysore Administration report for the year ending 30-6-18 with the Government review thereon. 1
11. Indian Forest Records Vol. VII. P. III. Note on Hopea Canarensis, Hole, by R. S. Hole 1919. 1

12. G. Huffel-Les Resources Realisables Des. Forests Allemaudis 1
13. The out-break of the war of 1914—18 by C. Oman 1919. ... 1
14. Proceedings of the Government of Bombay May 1919. ... 1
15. Indian Forest Records Vol. VII Part V. Notes on the Larvæ and Life Histories of Prionine Beetles, Coleoptera, Cerambycidae Prionini 1
16. Official guide and descriptive catalogue of the Madras Exhibition of Indian arts and industries 21—12—1917. ... 1
17. Index of the Proceedings of the Forest Department of the Bombay Government 1918. 1
18. War returns hand book. 1
19. Journal of Indian Botany by P. F. Fyson., B. A., Volume 1, September 1919. 1
20. Agricultural journal of India Vol. XIV. P. V. ... 1
21. Administration report of the Forest Department of Nizam's Dominions for the year 1327 Fasli. 1
22. Queen Mary's Technical School for disabled Indian soldiers. 1
23. Bombay Natural History Journal. Vol. XXVI. No. 3. ... 1
24. Proceedings of the Chief Conservator of Forests on the Inspection notes on East Kurnool Forests, Kurnool District by H. A. Latham Esq. 1
25. Proceedings of the Chief Conservator of Forests on the Inspection notes on South Mangalore Forests South Kanara District, by H. Tireman Esq. 1
26. Forest Bulletin No. 39. The Construction and Calcareous opercula by Longicorn Larvæ of the group Cerambycidi by C. F. C. Beeson M. A., I. F. S. 1
27. Progress Report of the Forest Research Institute for the year 1918—19. 1
28. Monthly Rainfall of India for 1918. 1

Contributions to the Gass Museum.

Serial No.	Contribution.	Contributor.
1	Three specimens of teak rafters attacked by Carpenter bees.	M. R. Ry. S. Shanmuga Kumaran Pillai. R. O. Ayyalur
2	Crude resin of *Hopea Odorata*?	M. R. Ry, N. Gopala Nair. R. O. Begur Range North Malabar.
3	Six samples of 3 - ply Veneer boards.	The Surma Valley Saw Mills Ltd., Calcutta.
4	A four-month old "Stumped" teak plant.	H. Tireman Esq. Conservator of Forests.
5	Photo of a Tali Palm.	Chief Conservator of Forests Bombay.
6	One long and one short panel of Red Sanders.	M. R. Ry. S. Ramachandrier H. R. Hons.
7	An iron weight bearing the initials of the H. East India Company.	C. M. Hodson Esq. Conservator of Forests.
8	Fifteen samples of Tinnevelly mats.	Mr. R. E. Lemos M. R. Hons. R. O. Ambasamudram.
9	Fungus on Anogeissus latifolia	M. B. Subbiah Student Sinior Division M. F. C.

Advertisements.

The following is a list of timber species required for the Gass Museum. Such of them as are procurable may be sent to the Principal *together with botanical specimens pertaining to each species and a sample of bark about 8" square.*

The long panels should be as broad as is available, 6 ft. long and 3" thick. The short panels 2 ft. long and 1" thick (breadth, maximum available).

Aglaia Roxburghiana.
Aquilaria Agallocha
Adina cordifolia.
Artocarpus integrifolia.
Albizzia procera.
Albizzia stipulata.
Acacia dealbata.
Acrocarpus fraxinifolius.
Berrya ammonilla.
Chickrassia tabularis.
Carallia integerrima.
Dillienia indica.
Dillienia pentagyna.
Dysoxylon malabaricum.
Diospyros tomentosa.
Diospyros paniculata.
Diospyros ebenum.
Dalbergia sissoo.
Erythroxylon monogynum.
Gmelina arborea.
Gluta travancorica.
Grewia asiatica.
Hardwickia pinnata.
Hardwickia binata.
Holoptelea integrifolia.
Hydnocarpus Wightiana.
Hereteria papilio.
Litsaea zeylanica.
Machilus macrantha.
Premna tomentosa.
Sterculia fœtida.
Sterculia villosa.
Sterculia guttata.
Stereospermum chelonoides.
Stephegyne parvifolia.
Tetrameles nudiflora.

The following numbers of the 'Indian Forester' are required for the *Students'* Library, The Principal will be glad to receive any that officers can spare :—

1. Volume 1, 2 and 3 for 1875—76, 1876—77; and 1877 —78.
2. Volume 6 for 1880—81.
3. Volume 14 for 1888—January, February, March, April, September, October, and December numbers.
4. Volume 15, 16, for 1889 and 1890.
5. Volume 18 for 1892 August, September, October, November.
6. Volume 19 for 1893 February number.
7. Volume 20 for 1894—July and August numbers.
8. Volume 21 for 1895.
9. Volume 24 for 1898—March and April numbers.
10. Volume 25 for 1899—April, May, June and August, September, October, and December numbers.
11. Volume 26 for 1900—August number.
12. Volume 34 for the year 1908—July number.
13. Volume 36 for the year 1910—August number.
14. Volume 39 for the year 1913—January, April, September and October Nos.
15. Volume 44 for the year 1918—March number.

WANTED.

A copy in good condition of "Hume and Marshall's Duck" with coloured plates intact. Apply stating price to the:—

PRINCIPAL, MADRAS FOREST COLLEGE,
Coimbatore, Lawley Road, P. O.

WANTED.

For the Library a copy (mounted if possible) of the June 1916 College Group.

Rs. 2—4—0 will be paid for it.

Madras Forest College,
Coimbatore.

F. L. C. COWLEY-BROWN,
Principal.

* * *

Indian Forester Prize 1920.

The subject for the above Prize for the current year will be:—
Subject for Present Students:

"Fire Protection and its difficulties: Should it vary with local conditions and species? The best methods?"

Special emphasis should be laid on concrete examples taken from actual experience.

The Prize is open to all present students of the College. A prize for an Essay on a different subject has also been allotted for all past Madras Forest College Students.

No award for either prize will be made unless a satisfactory standard is reached.

The Essays should be clearly written or typed *on one side of the paper only* and must reach the Principal not later than 1st June 1920. Essays should not exceed 2000 words: in a previous year a student was disqualified for infringing this rule. Each Essay must

bear a motto: the motto is also to be written on a sealed envelope containing the name of the competitor: the name of the competitor *is not to be written on the Essay.* Each Essay must be the bonafide unaided work of the Competitor submitting it.

* * *

A prize allotted from the "Indian Forester" Fund will be awarded to the past student of the Madras Forest College who submits the best Essay (limited to 2000 words) on the following subject:—

"Nature is the Sylviculturist's best guide."

No award will be made unless a satisfactory standard is reached.

The Essays should be clearly written or typed *on one side of the paper only,* and must reach the Principal, Madras Forest College not later than 1st June 1920.

Each Essay must bear a motto: the motto is also to be written on a sealed envelope containing the name of the competitor and a statement to the effect that the essay is his bonafide unaided work; the name of the competitor *is not to be written on the essay.*

Gazette Notifications.

DECEMBER 2nd 1919.

The privilege leave granted to M. R. Ry. S. Chidambara Ayyar, Ranger IV grade, S. Cuddapah dt. is further extended by one month and one day.

M. R. Ry. A. Vyasalu Ranger in charge of Kudligi Range, Bellary dt. is granted privilege leave for 20 days.

M. R. Ry. M. P. Halasyanatha Ayyar, Forester, II grade, Bellary dt. is promoted to act as Ranger, VII grade and posted to Kudligi Range of the same dt.

Consequent on the transfer of Rangers Shanmuga Kumaran Pillai, and Sankaran Nair from this district, the following arrangements are ordered:—

Mr. P. Velayutha Nayar, R. O. Sholavandan, to be R. O. Ayyalur.

Ranger Ramasamier, on special duty in Cumbum range, will be in charge of Nattam Range *vice* Mr. Sankaran Nayar. Mr. Thayuman will proceed at once to Nattam.

(1) M. R. Ry. A. K. Anantaramier Ranger VII grade is posted to Gudiyattam range, North Vellore Dn *vice* C. D. Parthasarathy Chetty granted leave.

(2) Posting of M. R. Ry. G. Devanayagam Naidu, Ranger V grade to Gudiyattam range is cancelled and he will continue on special duty in West Vellore Dn. (Nellivasal.)

(3) Mr. R. E. Lemos, Ranger II grade is posted to Ambasamudram range on termination of his Special duty, from 6th December 1919.

(4) Syed Munavar Sahib, Ranger V grade to take charge of Dharmapuri Range on relief by Ranger R. E. Lemos.

(5) Mr. B. R. Salisbury Ranger III grade granted 6 weeks' privilege leave, from date of relief by No. (4),

(1) Mr. L. J. Taylor, Ranger III grade in charge of Santavasal Range, S. Vellore, granted privilege leave for 3 months from 3rd Jan. 1920, with permission to prefix the Christmas holidaas.

(2) Mr. P. B. Sayid Yahia, Ranger VI grade will relieve No. (1) and hold charge of the range until further orders.

Mr. A. Nicholas, Ranger IV grade Tunacadavu Range granted 2 months' privilege leave with effect from date of relief.

Companion of the Indian Empire.

Robert Scott Troup, Esq., Imperial Forest Service, lately Assistant Inspector General of Forests, India.

David Alexander Thompson, Esq., Imperial Forest Service, Deputy Conservator of Forests, Bombay.

Rai Sahib.

Mian Budhi Singh, Extra Assistant Conservator of Forests, Punjaub.

* * *

The good services rendered by M. R. Ry. G. V. Subba Rao of the Madras Forest Service, who worked as Indian Overseer and clerk under the orders of Lieut. T. Clear have also been appreciated by His Excellency the Commander-in-Chief.

* * *

The following further contributions to the Students' Club are acknowledged with thanks:—

	Rs.
An Imperial Officer	100
M. R. Ry. A. Siddha Pillai	25
„ „ T. G. Sankaran Nair	25
„ P. Sankunni Menon	20
„ C. T. Tiruvengadam	10
„ S. Ramachandra Ayyar	5
„ M. Subba Rao	5
Mr. H. Myers	10

Killing Babul trees with Arsenic in the Madras Forest College Demonstration Forest. (*Continued*)

In continuation of the note on the above subject (*vide* p. 199, Vol. I, No. 4; pp. 66—67 Vol. II, No. 2; p. 38, Vol. III No 1.) the following resumé of results will be of interest.

(1). The operation should be carried out during the hot weather, when there is no fear of the interference by rain. (The minimum period required for completely killing the Babul trees experimented with during the rainy season is *11 months*, whereas the trees poisoned during the hot weather died within a minimum period of *6 months*.—p. 67 Vol. II No. 2).

(2). Poisoned trees die quicker than girdled.

(3). All the treated (poisoned, and girdled) trees coppice freely below the ring into which the poison is poured.

(4). The coppice shoots from the poisoned trees are less copious and less healthy than those from the girdled.

(5). Babul (in *South* India especially ?) takes a considerable period to die by poisoning. Neither girdling nor even poisoning is found capable of preventing coppice shoots. The latter, it is interesting to note, have however completely died in *all* the treated trees after persisting for about a year on the trees, in a more, or less healthy condition.

M. R. Ry. T. G. Sankaran Nayar Ranger III grade, posted to Tunacadavu Range, S. Coimbatore dt.

DECEMBER 16th 1919.

Mr. H. F. A. Wood, conservator of Forests III grade, to act as consr II grade, from 1st June 1919 upto, and including 26th July 1919 *vice* Mr. H. B. Bryant on furlough.

(1) Mr. P. M. Mathew, R. O. VI grade in charge of Sanipaya range, W Cuddapah dt. granted privilege leave for one month with permission to prefix Christmas holidays thereto.

(2) M. R. Ry. J. M. Abraham, R. O. IV grade in charge of Vempalle range W. Cuddapah Dt. posted to charge of Sanipaya range in addition to his own *vice* No. (1) on leave.

M. R. Ry. P. Ramunni Menon Ranger III grade Ganjam, is appointed as as Senior Instructor of the 1920 Session of the V. T. S.

DECEMBER 23rd 1919.

Mr. I. John and M. R. Ry. V. Jaganatham Pillai transferred to Western Circle.

M. R. Ry. C. N. Narasimhachari transferred to Bellary Range.

M. R. Ry. V. S. Rangasamy Naickar, Forester I grade promoted to act as Ranger VII *vice* ranger M. R Ry. S. Chinnadorai Pillai appointed as Senior Instructor, V. T. S.

M. R. Ry. A. Rama Hebbar transfered to Parlakimedi Maliahs

M. R. Ry. C. G. Krishnan, R. O. Nugur, transferred to Bandar range.

S. F. Lobo Forester I grade, S. Salem division appointed Ranger VII grade and transferred to W. circle, Coimbatore.

M. R. Ry. K. S. Ramiah, R. O. V grade granted privilege leave for 1 month and 17 days.

Mr. T. I. Chakko III grade transferred to Nilghiris for Mudumalai range.

M. R. Ry. P. Govinda Menon avl, posted to S. Malabar for duty under D. F. O.

M. R. Ry. L. S. Krishnan avl, to C. Coimbatore.

Mr. S. F. Lobo posted to Sullia for duty under the Forest Research Officer.

M. R. Ry. P. Govinda Menon, on relief by Mr Chakko transferred to C. Coimbatore Dn. for special duty.

This cancels his posting to S. Malabar and M. R. Ry. L. S. Krishnan's transfer.

JANUARY 6th 1920.

Mr. C. E. C. Fischer, Dy. Conservator of Forests on leave, is granted extension of furlough without medical certificate for one month from 4th April '20

M. R. Ry. C. M. Belliappa avl. B. A. appointed instructor V. T. S N. Salem Dn.

T. Kesavalu Naidu, Forester I grade appointed Assistant instructor V. T. S. N. Salem Dn.

A. M. Sreenivasulu Naidu transferred to N. Salem, for Denkanikota range.

M. R. Ry. T. S. Narayanasami Chetti, R. O. Sidhout range, granted privilege leave for 20 days.

20th JANUARY 1920.

The Six week's privilege leave granted to Mr. R. B. Salisbury, R. O. III grade from 9th Dec. 1919, is extended until 9th February 1920.

M. R. Ry. C. M. Narayanan, R. O. IV grade on return from leave, posted to S. Mangalore Dn. for special duty in removing logs buried in the Paishwami river.

M. R. Ry. C Karunakara Menon appointed Assistant Instructor, V. T. S. 1920 Session, Ci Coimbatore Division.

M. R. Ry. K. Karunakara Nambiar, N. Mangalore Da. will be for the present in charge of Sankaranarayana range in addition to his own duties.

27th JANUARY 1920.

Mr. F. X. Mascarenhas, combined leave for 3 months from 12th July 1919.

Mr. J. S. Scot permitted to return to day.

M. R. Ry. C. N. Narasimhachari posted to kudligi Range.

Temporary ranger P. K. Kuttappan Pillai transferred to Chittoor dt. for charge of Chandragiri Range.

M. R. Ry. A. Bhaviah, Chamala range, granted privilege leave for 3 months.

M. R. Ry P. Mathuramuthu Pillai granted extension of leave to 2—2—20.

M. R. Ry. A. Raju Nayakar avl. to be D. F. O. S Salem *vice* M. R. Ry. Rai Sahib E. C. M. Mascarenhas (retired.)

Muhammad Habibullah Sahib Bahadur to be special Forest Officer, Parlakimedi Maliahs, Ganjam Dt.

Mr. F. A. Seager to be D. F. O. L. Godaveri.

Mr. H. W. A. Gaudoin to be D. F. O S. Kurnool.

Mr. C. C. Wilson, on return from leave to be Imperial Instructor at the Madras Forest College Coimbatore.

Saiyid Abdul Qadir Sahib Bahadur on relief by Mr. C. C. Wilson to be D. F. O. S. Vellore, *vice* M. R. Ry. Rao Sahib K. R. Venkataramana Ayyar avl. on other duty.

Mr. R. D. Richmond promoted to act as Conservator *vice* Mr. H. A. Latham (granted leave) without prejudice to his duties as Asst. Inspector-general, and he will be seconded as conservator.

Mr. B. F. Rigold to act as Conservator of Forests, *vice* Mr. R. D. Richmond (seconded) and to be Conservator, S. Circle in relief of Mr. Latham.

Mr. G. C. Robinson, D. F. O. S. Malabar to be in charge of the Nilghiri division in addition to his own duties.

Mr. J. S. Scot, to be D F. O. S. Coimbatore *vice* Mr. A. Wimbush (granted leave).

M. R. Ry. C. R. Regunathan, R. O. Perambalur granted privilege leave for 2 months from date of relief by ranger P. Mathuramuthu Pillai.

M. R. Ry. R. Gurusamier posted to Mudumalai Range.

M. R. Ry. V. Jeganatham Pillai, posted to Nilgiris to assist the R. O. with the fuel supply.

M. R. Ry. S. Chidambara Ayyar posted to Bolampatti Range.

M. R. Ry. M. Rama Rao Kini transferred to N. Coimbatore to be on special duty under the orders of the Satyamangalam Range Officer in connection with the construction of the Willingdon Forest Rest-House.

Mr. T. I. Chakko granted combined leave for 3 months.

(1) Mr. H. A. Latham, Conservator of Forests, privilege leave for 5 months and 10 days and furlongh for 3 months and 5 days.

(2) Mr. A. Wimbush, privilege leave for 4 months and 22 days and furlongh for 7 months and 8 days.

(3) Mr. D. F. Barry, privilege leave for 4 months and 4 days and furlongh for 2 months and 26 days.

THE

Madras Forest College Magazine.

Published Quarterly.

Vol. IV. June 1920. No. 4.

The Madras Forest College Joint Camp at Kargudi.

Kargudi was chosen as the joint camp for this Year for various reasons. The Inspector General of forests visited the forests some time back and wished that opportunity might be taken by the Madras Forest College students to study the forests containing natural growth of teak, Terminalia Tomentosa and other species worked under improvement feelings. Another reason was to study the system of fire protection which forms one of the most important works. For the past few years Sadivayal was the seat of our joint camp, but it was given up by the Principal after careful consideration.

Kargudi lies in the Nilgiris District, Gudalur taluk and is very well connected by the Mysore—Ooty road, and Sigur road. By the former road it is 40 miles from Ooty and 27 miles by the Sigur Ghaut Road. Almost all of us rode to the place on our cycles and that being down hill (about 4000 or 5000 ft.) and the weather very enjoyable the whole journey was performed with much ease in about 5 to 6 hours from Ooty. Our camp was put up in the midst of spacious

(4) Mr. A. B. Jackson, acting Conservator of Forests privilege leave for 6 months and furlough for 3 months.

(5) Mr. T. A. Whitehead, privilege leave for 3 months and 20 days and furlough for 8 months and 10 days.

(6) Mr. H. Tireman, Acting Conservator of Forests privilege leave for 4 months and 11 days and furlough for 3 months.

Subject to the approval of the Secretary of State the Government sanction the re-employment of Messrs. C. Du Pre Thornton, and A. W. Lushington and appoint them District Forest officers, North Coimbatore, and Vizagapatam respectively.

M. R. Ry Rai Sahib E. C. M. Mascarenhas Avl. privilege leave upto 22nd February 1920 With effect from the date of relief.

M. R. Ry. E. B. Ramachandra Rav Avl. D. F. O. N. Salem to be in charge of the S. Salem Forest Division in addition to his own duties until he is relieved by M. R. Ry. A. Raja Nayakkar Avl.

(1) Mr. S. M. Razvi Sahib granted privilege, leave for 23 days from 12-1-20.

(2) Mr. H. McBride, R. O. Sriperumbudur Range, posted to Sathyavedu Range, *vice*, No. (1).

M. R. Ry. T. S. Narayanasami Chetty (M. R. L.) appointed to act of Ranger VII grade in the arrangement of M. R. Ry. V. N. Seshagiri Rao avl. B. A., Ranger I grade on other duty as probationary E. A. C.

Service order relating to the transfer of Ranger I. John to the Western Circle is cancelled.

M. R. Ry. S. Chidambara Ayyar transferred to Western Circle in place of I. John.

M. R. Ry. C. N. Narasimhachari on relief by M. R. Ry. A. Vyasulu transferred to Cuddapah Range.

FEBRUARY 24TH 1920.

Mr. J. S. Scot, Dy. Conservator of Forests, granted an extension of furlough for one month and 5 days.

Captain W. G. Dyson, M. C. B. Sc. Assistant Conservator transferred from S. Coimbatore division and is attached to the Direction Office, Western Circle, with effect from 16th February 1920.

The combined leave for nine months from 27th March 1919 granted to Md. A. Ghatala Sahib, R. O. V grade, Kurnool East Division is extended by six months.

area by the side of the Range office specially cleared for the purpose, and is 10 miles from Gudalur by road. Thus we stopped at a place where we could breath the purest air that could be had under the Sun. How enviable is the life of a forest officer when looked at from this stand point. While writing this I cannot but bring back to my mind how our experienced Principal had often told us that the soundness of an individual's health & consequently of happiness in life lay in the quantity of pure air he inhaled every-day.

The roll call for both the divisions was on the 9th January evening at, 6 P. M. and the students who went to the different parts of the Madras Presidency and of Bombay also during Xmas holidays were present. Their camp kit having arrived there previously from Nilambur and Nedungayam by the careful arrangements of the College authorities the students were comfortably put up in their tents.

The tents of the Senior Division were pitched in the form of 'L' in two rows and with the arrangement of the name boards and stones along both sides of the road-way between the tents, it looked like a beautifully decorated street. The Junior division tents were put up in the form of a rectangle, one row of tents on each side with a pathway leading all round leaving in the middle a large space where the students occasionally enjoyed the evenings in merry groups. The competition between the two division Havildars in vieing with each other in beautifying their individual division camps was very keen, and our Principal after close examination much appreciated their work. Being in the midst of forests our nearest market was Gudalur at a distance of 10 miles. We cannot sufficiently thank the authorities for having made arrangements with a contractor to supply us with all our needs at Kargudi. Mr. P. Govinda Menon,

E. A. C., in charge, enquired after the needs of the staff and students, and made very kind arrangements to get milk, eggs etc, from distant places and mutton on alternate days.

Though we camped at a place removed at least a mile and a half from the source of water supply where-from we had to get water for our daily consumption including bathing, yet we had nothing to complain of. Two iron tanks fitted with pipes were got and filled with water, one for the use of the officers and the other for the students. The amount of care and control that had to be bestowed on this will be better realised when it is understood that water carts had to come all the way uphill along steep ghat road, and that the total number of persons to be supplied daily was not below 150. This difficulty of water supply was under consideration for a long time and the authorities have begun digging a well. They have gone probably 40 to 50 feet down and have come by a large sheet of rock which has to be blasted. The fear whether the whole thing will collapse, if blasted, coupled with want of skilled labour is delaying the work It is however presumed that the water will be tapped when the rock is blasted. It is devoutly wished that the work will be taken on hand, and finished soon to the comfort and convenience of all concerned.

The students stopped there for over 6 weeks and the conservator of forests, Mr. Tireman also stayed there with the Principal for a few days during the course of his usual tour of inspections He took the opportunity of visiting the students' camps and made kind enquiries of their comforts. One evening he wanted to see the pulling up of trees with roots with the aid of a Monkey Jack. Within a few minutes of his arrival to the spot, Mr. Cornwell, the senior Engineering Instructor, and officer in charge of Senior Division

Camp, selected two trees and with the aid of 4 students from Senior Division, knocked the trees down; the Conservator was quite pleased with the work of the Monkey Jack.

I cannot render justice to this article without a few words about the past and present state of the forests here. These forests are called *Mudumalai* leased forests. They are held by Government by a lease from the Thirumalpad of Nilambur on a rental of Rs. 4500 a year. During the early part of the 18th century the Thirumalpads leased this forest to private contractors at low rentals who exploited the workable areas by removing all sound teak, and other valuable trees in an irregular and unsylvicultural way. This state of affairs went on for some time till the valuble nature of the forests and the wanton depredations made therein were brought to the notice of Government who as the custodians of public interest intervened to preserve the forests from destruction and to work them on systematic lines. Apart from the irregular fellings to which these forests were subjected, as explained above, they were always overrun by devastating fires. The Government took up the area on a lease for 99 years and while extracting mature tree growth, treated the area under sylvicultural methods. The timbers extracted were sent to Ooty, Wellington, Coonoor, Bangalore, and other places where they were used for the constructions of Government buildings. Steps were taken to fire protect the areas more about which will be found later on. As these forests contain valuable tree growth which has to supply the growing demand of the country, it is wisely thought that it will not be safe to entrust its management to private persons, who might care for profit and not for the interest of the people at large. Government have, therefore, acquired the area by awarding over a lakh, and twenty thousand rupees. The area will have to be settled

and it is hoped that it will be duly constituded as Reserved Forest in about a couple of years.

The total area of the forest is over 50,000 acres and consisst of mixed deciduous species. The configuration of the gronnd is undulating with very gentle slopes. Small plateaus occur here and there at the tops. The soil is generally loamy clay and is the resultant of disintegrated gneiss. Swamps also occur here and there and these are for the most part bare, except for a few stunted trees of water-loving species such as Lagerstrœmias, Pongamia, Eugenia etc. The rainfall averages 50" a year and the climate is hot in the day and cold at nights. The important species found are Tectona grandis, Terminalia tomentosa, Anogeissus latifolia and Dalbergia latifolia to some extent and various other species. These grow to a good height and the teak now found in the forests is either the refuse left out in the past or the result of coppice shoots. Annual fires have left their marks on the trees which are in 9 cases out of 10, unsound and badly shaped. The undergrowth chiefly consists of very tall coarse grass which attains a height of more than 10 feet and inspections except on elephants' back are not possible. Bamboo to some extent is found around swamps and along the margins of streams where Lantana also is mixed up. The forests are connected with few roads and will have to be opened further.

The abnormality of forests does not allow of their being worked under any of the regular methods. They have, therefore, to be brought to a state of normality and to this end they are being treated under improvement fellings for the past 10 years so as to get a mature forest of sound teak, chiefly from Coppice, in as short a time as possible, by cutting back the badly shaped ones, by providing overhead light for those that struggle for supremacy by either cutting

or ringing inferior species, and by thining out conjested coppice growth in stumps. Natural regeneration is induced wherever possible by leaving seed bearers and by tending the seedlings already on the ground. The students did practical work in this direction for more than a week. The method is purely cultural and no expenditure is spared. Timber obtained from the operations is disposed of in the local depots.

Another important operation annually conducted at a heavy cost of about Rs. 3000 to Rs 4000 is fire-protection. The forests are surrounded by Mysore State forests and in the past there having been no fire lines between these two areas fires freely entered. How far these fires wrought mischief may be well seen in block III adjoining the state forests which are the standing monuments of the past carelessness and want of thought. Block III contains no growth worth the name and it is hoped with the present treatment it may revive. The chief cause for fire in the past was intentional firing by Minor Forest Produce Collectors. Fortunately these have been stopped. Block lines and Compartment lines to a width of 100 feet have been established. The common boundary line between Mysore and Government forests has been made 300 feet broad. These lines are cleared and burnt every year in time and the total length of the fire lines is approximately 120 miles. The lines (Block and Compartment) are closed lines and they are now being converted into open lines. The sooner this is done the better. The students had practice in cutting and burning fire lines thus gaining first hand knowledge in all directions. The E. A. C. students came from Dehra to study this system of fire protection and other things and stopped at Kargudi for a few days. The fauna of the forest is varied. Elephants are numerous and catching operation is rather successful. During our stay 3 elephants were captured. Tigers and Cheetas

visited our camp almost every day. Large herds of bisons and samburs can be met every where. The forests abound in game and shooting is controlled by the 'Nilgiris game Association'. Even the forest officers are required to take out shooting licenses at a heavy cost. The sooner they are exempted the better it will be. Messrs. Longrigg and Cornwell took out special licenses and bagged some game. The students were kindly supplied with flesh on all occasions.

The question of obtaining labour is rather a difficult problem and the Kurumbers are the only people available. Most of these are Mahouts and kavadies attached to elephants which were 47 when we saw them and various attempts were made to settle these Kurumbers but without much success. The ill-reputation of the place for fever does not attract men from distant parts. It is not known how far it will succeed, if the department permanently assigns paddy flats, provides living accomodation with the supply of building materials and employ guards and Foresters out of Kurumbers—the only condition being that they should supply available labour when required by the department. In the long run this may prepare the way for the introduction of Village Forest System as on the Javadis.

Much of value was learnt in this Camp by the students of both the divisions. They saw a natural forest brought to a degraded state for want of system and control; had practice in conducting and marking for improvement fellings; learnt the method of fire-protection and saw the effects of fires on forests. The seniors were engaged in preparing a working plan and this opportunity was taken as to how they should gather information for the preparation of working plan and prepare stock map. They saw the construction of wooden bridges and were much benefitted. The juniors had practice in Lantana clearing, laying out an inspection path and charcoal burning. The

year's Marathon Race was run and one evening the students were 'at home' [concert and Tea party] to Mr. & Mrs. Cowley-Brown and the Staff. They had the rare opportunity of witnessing capture of elephants. The last but not the least was that the ties of friendship between the two division students, who were separated for a long time by separate camps, have been drawn closer.

Though the place has the reputation of being malarial no student suffered from any attack continuously. Some had fever for a day or two. This may be ascribed partly to the fact that the training given has so greatly improved the physic of the students as to resist illness and partly to the preventive measures taken by administering quinine at least twice a week and by keeping the camp in a perfectly sanitary condition. Our thanks are due to Mr. De'Cruz, our Senior Sub-Assistant Surgeon, for the prompt way in which he dealt with any case of illness. It should be told to his credit that but for his care and prompt treatment two of the students' servants who were attacked with double pneumonia and one or two of the E. A. C. students from Dehra, might have fared rather badly.

Our Principal stayed with us and all his evenings were spent in the students' camp in studying their needs and rectifying them promptly. Mrs. Cowley-Brown invariably accompanied him and on all occasion made kind enquiries of the sick students. The Students are very greateful to the Principal and staff for the convenience and comforts afforded them in that out-of-the-way place. Mr. P. Govinda Menon E. A. C. in charge did all he could, as an officer on the spot, not only in accomodating the whole College comfortably but in making arrangements to suit all their requirements. Our heartfelt thanks are, therefore, due to him.

T. M. Doraisami Pillai.

The 1920 Marathon Race.

The year's Marathon race was run by the students of both the divisions in their joint camp at Kargudi on 31—1—20 and it differed from previous ones in more than one respect. The course covered a distance of 8 miles, while that of last year's was 6 miles 5 furlongs 100 ft. The whole distance lay along the Mysore — Ooty road starting from the 5th mile stone and finishing at 1st mile stone, running to and fro. Though it was along open road yet it was by no means easier as its contained many ups and downs. Another feature was that it was run for the first time at Kargudi while the previous ones were at Sadivayal.

The race was started precisely at 7 A. M. in a very fine weather, and Mr. R. B. Cornwell, the officer in charge of the Senior Division Camp rode to first mile stone to give chits to the students while Mr J. H. Longrigg officer in charge of Junior Division started the students. Mr. R. B. Cornwell came back in time to see the winners approaching the goal.

From the very beginning Senior student M. B. Subbiah, S. V. Doraisamy Iyer, V. Narayanaswamy Iyer and A. Rama Rao were leading in order and came back to the winning post, to the surprise of all, in the same order. G. Sankara Pillai, who was the fifth, till he came within a few yards of goal, had to yield his place to his opponent K. G. Monappa who had been hotly pursuing him during the whole course. Thus Sankara pillai became the Sixth. Three of these winners were also winners during the last year. M. B. Subbiah who came second last year within 53'10" (a distance of 6 miles, 5 furlongs and 100 feet) came first this year in 50' 30" (a distance of 8 miles) and looked quite fresh as though he had not exerted at all. It

is very pleasing to note that he broke all previous records. S. V. Doraisamy Iyer, the 2nd in this race had lost his way with C. L. Narayana Rao and was therefore not one of the last year's winners. V. Narayanaswamy Iyer who was the first last year, came third in this race probably for want of practice. A Rama Rao's rank remained stationary but the improvement lay in the time he took to complete the 8 mile course (57',) while he took the same time for 6 miles and odd last year. K. G. Monappa could not be one of the winners last year as he suddenly got ill while running halfway.

The students are grateful to all the visitors for the loud cheering they gave them when in sight of goal. The one glaring feature of this race is that all the winners are from the senior division and is certainly due to improvement in their physic as a result of training in the Madras Forest College for over a year and a half. This fact is more amply proved when the result of the race considered as a whole, that the senior division won the inter-divisional cup kindly presented by the late lamented Rissaldar Major Amir Abdul Hamid Khan Bahadur, by 67 points to 200. It will not be out of place to point out here, that the present senior division won the cup last year from their seniors by 78 points against 141.

All the seniors and all but 2 juniors, who were exempted on medical grounds, 57 in all, ran through the entire course successfully and the last man completed it in 1 hour and 32 minutes. The students are very much indebted to the Principal for his hearty ovation to each student as he approached the goal, for his paternal care to get the students examined by the camp Sub-Assistant Surgeon immediatety they reached the winning post, and to Mrs Cowley-Brown, whose maternal care for the welfare of the College students was never found wanting, for the arrangement to serve cold drinks to all the students as they came along, which they enjoyed very well after

a very hard and a contested run. The occasion was marked by the presence of Mr. Tireman, the Conservator of forests, western Circle who always takes a keen interest in the well-being of the College. The staff and Messrs Tireman, and P. Govinda Menon E. A. C. were served with light refreshments.

The students were then drawn up in two lines and the Principal, while congratulating the seniors for having won the day, appreciated the efforts put in by the juniors on the occasion and wished them good luck in the next race He spoke of the merits of the winners individually and expressed, that he was all the more pleased of S. V. Duraisamy as he came off unexpected. He then requested Mrs Cowley-Brown to give away the prizes. Unlike last year the prizes differed The first prize was a miniature cup and the rest all articles, very useful to students in everyday life thus serving as a remembrance of their past College life The students are thankful to the donor and to Mr. Cornwell for the pains he took in going to Ooty and purchasing the prizes after careful selection.

The function was brought to a close by three cheers to Mr. & Mrs Cowley-Brown and to Mr. Cornwell and others who spared no pains to make the race an entire success.

First Prize.	M. B. Subbayya	50′ 30″
Second Prize	S. V. Doraiswami	53′ 39″
Third Prize	V. Narayanaswamy Ayyar	55′ 30″
Fourth Prize	A. Rama Rao	57′
Fifth Prize	K. G. Monappa	60′–4″

6. G. Sankara Pillai
7. N. M. Karumbayya
8. K. Thangavelu Pillai
9. I. Ramamoorthy
10. C. S. Ganapathi (Coorg)
11. K. Appayya
12. M. Sankaran Nair
13. S. Ramalingam

14.	G. S. Ganapathi (N. C.)	34.	M. Parameswara Ayyar
15.	P. Kannan	35.	J. D. Muthiah
16.	K P. Chathu Nair	36.	T. Sriramulu Naidu
17.	K. R. Subramaniam	37.	Venkatesan
18.	T. L. F. Perera	38.	V. R. Kamalapur
19.	D. N. Subramania Ayyar	39	T. Perumal
20.	M. P. Subbayya	40.	D, Krishnaswami
21.	J. D. Theodore.	41.	K. O. Anandan
22.	K. Venkateswarulu	42.	B S F. Lebbai
23.	Abdul Rahim Khan	43.	T. P. Palanikumaran
24.	S. Nageswaran	44.	K. Raghavan
25.	T. M. Doraiswami Pillai	45.	C. K. Abyankar
26.	N. S. Eswaran	46.	P. A. Madhavan
27.	P. V. Krishna Rao Naidu	47.	A. N. Ponniah
28.	A. Krishnamachari	48.	Nur Ahmed
29.	B. Krishna Rao	49.	K. R. Murjani
30.	A. R. Manuel.	50.	P. Sankunni Nair
31.	B. N. Dev	51.	M. P. Phillip
32.	G. Appa Rao, L. E. Juriansz, P. Chengal Reddi	52.	K. Seetharamaiah
		53.	G. Venkata subba Rao
33.	C. K. Gulrajani	54.	Abdul Rahiman
		55.	S. Nagalingam Pillai 1—32

Students V. N. Subramania Ayyar and Raghuraman under medical orders did not run.

The Senior Division won the Abdul Hamid Cup by 67 points to 200

A comparative statement of the time taken by the first of the winners of Marathon Race during the last 5 years is given below ;—

1920	M. B. Subbiah	50′ 30″	Course being 8 miles.
1919	V. Narapanaswamy Iyer	51′ 12″	Course completed being 6 miles 5 furlongs 100 feet.
1918	P. K. Parameswaram Pillay	54′ 45″	
1917	C. S. Nanjappa	52′ 0	
1916	C. S. Nanjappa	56′ 15″	

T. M. Doraisami Pillai.

Village forests and their relation to Travancore and Cochin.

Introduction.

It looks as if the native states of Travancore and Cochin have been free from the influence of that cataclysmic change, which took place in the whole of the Madras Presidency, in the relationship between the Forest Department and the agrarian population some 10 years ago. In the plenitude of the natural resources of the States, the ryot has not felt his wants keenly. People who look ahead can see visible signs of impending changes that are bound to take place in the Forest policy of the States. The disafforestation of porambokes and other valuable forests in the vicinity of villages tend to create new factors, hitherto non-existing and the voice of the agrarian population would become more clamant in future.

Consequently a broad classification of forests has to be made on the lines suggested by the Forest committee which sat under the presidentship of Mr. Horne some 10 years ago in the Madras Presidency. The division should be into "State Forests" i. e., forests maintained for the benefit of the State and "Communal forests" i. e., forests for the benefit of the village community.

History of Village Forest in South India.

The beginning of this century witnessed the birth of a new institution in the annals of the Madras forests the "Forest Panchayat". The genesis of this institution lay in the clashing of interests between the Forest Officers and the agrarian population. The zeal of the Forester carried him beyond bounds in his efforts for the conservation of forests, while he seldom understood, or sympathised with agrarian wants. This lack of understanding and sympathetic insight into local conditions, and concomitant harshness in dealing with village folk, led to tremendous agitation and champions of the popular cause crossed swords with the Government by what may be termed "passive resistance" and an enquiry into agrarian grievances was the outcome of it. The recommendations of the Forest Committee crystallised into a broad classification of forests and the creation of a new institution, the "Forest Panchayat", conferring on it a small measure of autonomy, unshackled by the interference of Forest subordinates. These Panchayats are now, to some extent, justifying the Economists' definition of "Village forests" as "forests administered by the village for the village".

The Forest Panchayat and its constitution.

The Panchayat system is one of considerable antiquity in India and it formed the characteristic feature of the Government of a village community. It has been described as "a little republic" since the days of Lord Metcalfe and now exists as a "living fossil". It is the rehabilitation of this institution that is now engaging the attention of the Government.

Amongst local matters which engaged its attention, Mr. John Mathai in his treatise on "Ancient village community in British India' points out that the common enjoyment of grazing and wood cutting formed an integral part, but with what degree of efficiency they managed it we have no authentic information about. The Forest

Panchayat differs from it in that it has no multiplicity of functions to perform and all its attention is focussed on the management of forests for its own enjoyment.

The word "Panchayat" indicates the possibility that the number of those who constitute the Panchayat is five, but this number was not strictly adhered to, as it is understood that there were only three members in a Panchayat in North Arcot. A great deal depends on the selection of the 5th member who may act as moderator, and one village should be the unit of management for a Panchayat.

In an ancient village Panchayat the following qualifications governed the selection of members:— (1) Persons must have more than 2 acres of tax-paying land. (2) They must live in their own houses built in their own sites. (3) They must be above 35 years of age and below 70. (4) They must be conversant with business. (5) They must be virtuous and lead honest lives.

In the constitution of a Forest Panchayat, wealth and position count for nothing, cattle owners being preferred. It is this consideration that has made the Panchayat an ignominious failure in some cases.

To avoid such pit falls I would commend the constitution of the Panchayat on the lines suggested. Further, I am not one of those that are enamoured of having so many water-tight institutions existing side by side.

The old village Panchayat, which is now undergoing a process of rehabilitation can be restored to its former glory, but care should be taken to see that at least one or two members are sufficiently well informed on forest affairs.

The grievances of the ryots may be classified under three heads.

Agrarian grievances.

(1) Adequate grazing grounds. (2) Supply of fuel and small timber. (3) Manure leaves.

Cattle are an economic asset contributing to the material prosperity of the agricultural population. Grazing, therefore, forms an essential possibility of a forest.

Grazing.

As pointed out by Sir John Woodroffe, the wisdom of the ancient Smritis provided that, for every village and township, a certain amount of pasture land should be set apart. Every village was a homogenous entity in itself in that it had its own communal grazing grounds and convenient water supply in the vicinity. These ideas are worthy of being adopted in our modern system of village forests. The mere assignment of areas will not settle the question once for all. Their management is essential not only in the interest of grazing, but also of remaining areas. One of the first essentials of economic treatment of a forest is the prevention of excessive grazing.

Of late, there has been some encroachment on lands suitable for grazing. The disafforestation of lands at the disposal of Government and registry of tanks for cultivation tend to increase the strain on other available lands for grazing, and complicate the situation. It is held by some that the policy of the Government is economically sound owing to the growth of population. Mr. Blackwood is of opinion that, though the cattle may suffer to some extent in the process, it does not appear possible for Government to prevent it, nor does it seem desirable to prevent it. He suggests the growing of fodder crops, the main principle being to have grazing and cropping alternately. By throwing land open for grazing, it gets rest and manure for future crops. This suggestion can however work well only in the case of large land owners.

Economic aspect of grazing.

It seems to be however agreed that more ample facilities should be given for grazing, and the path of wisdom lies in following and adopting the classification of forests on the lines laid down by the forest committee in Madras. A great deal of spade work is necessary in this direction.

Grazing is quite incompatible with all sound principles of forestry. Apart from the injury to the forest, it has all the objections of promiscuous and communal grazing. Mr. H. C. Sampson wrote some time ago that "it is a noticeable fact that the nearer cattle are to the forests, the more degraded the type." Here one sees the evil of mixed grazing. Forest grazing is always a serious menace to forests, and not only to the forest but to the supply of wells and tanks. Grazing and forestry are and must be at variance for, as the forest canopy increases, the grass tends to disappear, and the simplest way of lessening shade and increasing the grass is by forest fires. Though the truth of this statement remains undisputed, it is against all principles of Forest conservancy.

Grazing and Forestry.

The remedy for this state of affairs is partially in the reduction of what may be called the drone cattle to reasonable limits, in the segregation of the different classes to avoid evils of promiscuous breeding, and in providing ample fodder.

The Grazing Problem in Travancore.

The problem of grazing is worked with less rigour in Travancore. The Government have realised that a large measure of reform is necessary in this direction and grazing blocks are constituted wherever there is keen demand, for grazing Subjects of His Highness the Maharaja enjoy a certain amount of free grazing with the exclusion of goats. Grazing fee is collected only for foreign cattle. We now need a more

forward policy not only in the conservation of existing areas, but in their management.

Grazing possibility.

The fixing of the grazing possibility forms the corner stone of the whole structure. It may be broadly enunciated that the possibility of a grazing area should be such that the capacity of reproduction of a forest should be equal to the capability of consumption of cattle. This equilibrium should always be maintained. Mr. A. W. Lushington made a test in Kurnool as regards the eating capacity of cattle and it has been found that horned cattle require 1·05 tons of boscage and 57 tons of dry grass per annum. Sir D. Brandis showed that reserves on the plains of Cuddapah and Kurnool would produce an annual yield of one ton per acre, but this is from a protected type of forests. We may roughly estimate that we require 2 acres per head of cattle. I would commend that this possibility may be kept in view in the case of Panchayat forests.

This in itself will not suffice. The area should be rigidly protected from fire and illicit grazing by insulating it by means of a fire line. Further, the divisions of grazing area into blocks and their periodic closure is of imperative necessity. Improvements of water supply should be made wherever necessary. The Madras Government realised its importance and made a provision of Rs. 20,000 for the ensuing year.

If with the imposition of these restrictions, the grazing area does not suffice to meet local demand, we shall have to follow in the wake of Hyderabad by planting large areas of guinea grass and leasing out grass cutting in restricted areas.

Lastly, the question remains for consideration whether grazing should be free or not. Subjects of His Highness the Maharajah enjoy free grazing and any step to impose grazing fees may meet with stout

opposition. The evils of unrestricted grazing are many. Apart from the damage to the forest, incendiarism is common. To avoid these, delimitation of area should be accompanied by a small fee which may be returned to villagers in case of successful protection of forests from fire. It is also possible that people may not mind to pay grazing fee, where better facilities for grazing are provided.

Classification of Forests.

The Madras Forest Committee classified the forests of the presidency under six heads. It is needless to enter into details in a discourse to the lay reader; for our present purposes, the last two classes may be taken up for consideration. Under these classes come those forests adjacent to villages. The two classes are entirely managed by the Panchayat, and are under the control of the Revenue Divisional Officer. In Travancore and Cochin, the Diwan Peishkar will have to step into the place to undertake the new responsibility. The Panchayat is held responsible for grazing fees, fire protection, tree growth and clearing of boundary lines. It would be better if grazing possibility is fixed and then areas handed over to the Panchayat to avoid future surrender of valuable forests for grazing. The Panchayats are vested with power to impound cattle for illicit grazing and regulate removal of fuel from class V forests. The forest department may inspect, and report on, the condition of the grazing blocks to the Collector.

Supply of fuel and small timber.

Under the old permit system, villagers took head-loads of fuel and small timber from the forests for their daily wants and sold what was in excess. To prevent this, small coupes may be opened and villagers induced to take up contracts in class IV forests. If this does not meet local demand, the introduction of species Acacia dealbata may be tried, as it

would not only enable us to meet demand, but would be in harmony with the hacking instincts of the people.

Supply of manure leaves.

The problem of the supply of manure leaves assumes gigantic proportions in districts like Madura and Travancore. In two ranges in Madura, it is said that there is demand for 43,000 cart loads, and assuming that one acre of land yields one cart load 43,000 acres are required. I believe that the forests cannot bear the strain of such heavy demand on it In south Travancore, we are making some strides to meet the increase in the demand of the ryots.

First, the removal of manure leaves from inferior species of trees at a seigniorage of four annas is allowed from coupes from the Thadikarankonam fuel working circle in one range. Secondly, experimental plantations of Cassia siamia are raised to supplement the supply. Lastly, it is being recognised that the problem should be tackled by the Agricultural Department, and the ryots should be educated to raise leguminous crops between two crops of paddy. An endeavour in this direction is said to be made in Madura and ryots are induced to raise crops of Tephrosia purpuria and Sesbania between two crops of paddy.

Conclusion.

The Forest Panchayats are still in their infancy and in some of the villages, villagers have not learnt to appreciate this small beginning of self-government. To place the Panchayat on well-oiled foundations, I emphasise the importance of the constitution of the Panchayat on the lines suggested. Mr. Elphinstone observed in 1821, "Our principal instrument must continue to be the Panchayat, and that must be exempt from all new forms of interference and regulations on our part." This should be our guiding principle.

In some parts of Travancore and Cochin, the institution may be introduced with success.

L. A. Krishna Ayyar,
Range Officer.

Forest Guards — the best way to recruit them.

One and all who are following the affairs of the Forest department in this Presidency will agree with me that in the Forest department, the recruitment of Forest Guards — the mainstay of the whole administration — should be improved. What with the Hydro-electric scheme, the new development of Forest Industries, the stock-mapping of Forests by the aid of Aeroplanes, the proposed scheme of Police Force in Provinces, the recent re-organization of the Forest subordinate protective and executive staff, the daily increase of Forests under working plans, the introduction of Research in Sylviculture and Forest economy all demand a better type of a Forest Guard than the present one. As we know, the present Forest Guard is selected on a haphazard manner. It is high time for us to reconstruct.

The best method which appeals to me—there may be better methods—is as follows: The recruitment of Forest Guards should be done once or twice in a year. The recruitment should not be made at all times of the year. A couple of months previous to the date of selection, notices should be inserted in the local District Gazettes calling for applications. The applicants are expected to fill up the prescribed forms of application and submit them. The application forms as at present prescribed in some districts are satisfactory except that two more columns should be opened: 1. Whether the applicant was in Government service before; if so, the reasons for the termination of that service. 2. Whether the applicant is prepared to serve on hills if posted

there. I have personally met with some instances where the Forest Guards were dismissed Police constables or guards whose services were terminated for bad work in other ranges of the district. These applications should be submitted to the Range Officers of the various Ranges in the Forest district. The Range officers will personally see the candidates and thereupon submit the applications to their District Forest Officer. The Dt. Forest Officer will then make his selection and order the applicants to appear at the Head Quarters of the district on a certain day. Out of these applicants the District Forest Officer, with the assistance of two of his best Rangers in the district, will inspect the candidates and select the required number. Steps should be taken to see that 25 per cent more than the required number should be selected. After the selection, a list of selected candidates in order of merit will be prepared and the required number will be ordered to appear before the District Medical and Sanitary Officer of the district for the production of certificates of fitness. The candidates so producing the certificates will be posted to the various beats in the district on probation for one year.

During the period of probation, the conduct and work of the Forest Guards should be carefully watched by the Range Officers. The probationers must be sacked mercilessly if they are found to go out of the way. A list of such guards whose probations have been ceased should be maintained at the district office and a copy communicated to each Range officer in his district so that the miscreants may not get in again during the following selection.

If the guards give satisfaction during the period of probation, they may be confirmed and sent to the Vernacular training School of the district for technical training after the lapse of the year. When

they return from the Vernacular training School, they are expected to have their final polish and fit to be ornaments of the Range.

As regards the hills such as Javadis, Nallamalais, the recruitment of Forest guards may be done from the hill tribes themselves, and as my experience goes I can safely say they are a good lot provided you humour them a little.

Finally, I close my letter with a fervent hope that mine may not be a cry in the wilderness but that something should come out of this proposal.

G. N. Subba Rau,
Forest Range Officer,
Attur. Salem Dt.

[We agree with Mr. Subba Rao in thinking that a Forest guard should be trained at the Vernacular School within a year of selection; a 'refresher' course every six or seven years would certainly be advantageous. Editor.]

A Study of Reeds.

Distribution:—

The growth of reeds is confined to the District of Malabar, and the States of Cochin and Travancore. The writer had the opportunity of studying the habits of two Species, *Ochlandra Rheedii* and *Ochlandra Travancorica*. The former is found growing in thick clumps on most of the Rivers of Travancore at lower elevations. The latter grows gregariously from sea level to 5000 feet, according to Mr. Bourdillon. It forms the undergrowth over very large areas of forest, especially in *North Travancore, at Nadukuni* and other localities right up to the crest of the hills occupying the whole of the ground covering the slopes with dense impenetrable thickets to the almost total exclusion of all other vegetation.

Requirements of Reeds :—

Reeds require for their mainstay three elements, abundant moisture, light, and drainage. Where it enjoys these factors of locality it reigns supreme to the almost total exclusion of other species. It is conspicuously absent in ever-green areas where it is kept out by heavy shade. Land that has been cleared for cultivation by hillmen and abandoned often becomes covered with thickets of reeds, though before the clearing was made, there may have been only a few clumps alone growing in the forest.

Spread of Reeds :—

The Spread of reeds forms a very interesting study. The writer had the opportunity of bestowing great attention in North Travancore. To my mind, it appears that reeds may have had their origin along the banks of rivers and may have then followed the line of least resistance along the minor ravines and brooks flowing into the main river, and then spread sideways in all directions. Thus it is that reedy areas have come to encircle patches of good vegetation which are generally on fairly level country enriched by the wash brought down by the rains. This might have been augmented by cultivation by hillmen, on which great stress is laid by Mr. Bourdillon, and other Forest officers.

Effect on Fresh Growth :—

This process of growth of reeds may have been silently going on in the past in North Travancore that have now standing monuments of tree growth, few and far between, while all the intervening space is occupied by reeds. This is the case in Chattampara, Ayanikampara and portions of Nadukuni. To bring about such abnormality in growing stock, it is likely that reeds may have attained their supremacy some 5 or 6 decades ago.

The Future of Reeds :—

The future of reeds is at the hands of the moulders of Forest policy who should decide whether the object of management of the forest is for fostering growth of valuable species of timber, or of reeds.

If the object of management is to foster regeneration of valuable species, we have to devise ways and means for the same. In this connection, I am reminded of what Mr. Ribbentorp wrote unofficially some years ago in connection with bamboos, and that is that we should employ fire during seed years. *Ochlandra Travancorica* is said to flower once in seven years, and *Ochlandra Reedi* annually. This opportunity should be availed of, and reeds destroyed in compact areas. Intense planting operations should follow.

Economic aspect of Reeds :—

Reeds are a great economic asset contributing to the material prosperity of the indigent population. Millions of *Ochlandra Travancorica* are cut every year in North Travancore, and mats &c made out of them. During the period of war, this industry received a great impetus, as a very large number of them were exported from the state. The Kanies make very fine mats and caskets out of them. They also build very neat and clean huts of the culms and thatch them with their leaves.

All this pales into insignificance in the light of recent revelations that an excellent paper could be obtained from them. Writing in 1908, Mr. Bourdillon states that 'twenty five years ago a paper Mill was built in Punalur with the object of converting Etta pulp into paper for which purpose it is admirably suited. The enterprise failed because it was started without sufficient capital and without a thorough enquiry into the nature of the fibre and the uses to which it was best suited

and there is no doubt that if another attempt were made, it could with experience gained be made to pay handsomely."

It has now been found by experts that reeds yield a fine quality of paper, and we may expect a development of the industry in the states of Travancore and Cochin at no distant date. Certain preliminary enquiries are essential on the following lines:—

1. Extent of area overgrown with reeds.

2. The quantity that could be collected every year. It is said that 25,000 tons of reeds are necessary to keep a factory running.

3. Method of transport; Cheap transport is a desideratum for success.

4. The periodicity of flowering; whether flowering extends over very large areas simultaneously and whether the factory would have to be kept idle during those years.

5. The rate of growth of reeds.

6. Whether clear felling is to be resorted to and with what rotation.

The best method of management of reedy areas should thus form a preliminary study. Conditions in North Travancore may be more suited for the manufacture of Paper Pulp. It has been pressed before the Industrial Commission that State-pioneering of this Industry is essential for success. With State patronage, we may then hope there is a glorious future for reeds.

L. A. KRISHNA AYYAR,
Range Officer.

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Notes on Pterocarpus Marsupium.

NATURAL ORDER. LEGUMINOSÆ. (PAPILIONACEAE).

Part I. Sylviculture.

1. DISTSIBUTION:—

It is found in deciduous forests all over the presidency and in Ceylon and Mysore in a scattered state. It is rare in districts which have poor forests

2. LOCALITIES:—

(a) *Climate.* It is found at all heights between sea-level and 3500 feet. On hilly grounds it prefers north and west aspects. It will thrive in places having even 20″ rainfall and the growth and development improve as rainfall and factors of locality increase.

(b) *Soil.* It grows best on a sandy and slightly clayey loam. Grows in laterite where there is enough of moisture in the soil Will grow on rocky laterite and is well suited to gneissic soils. Will not grow on sandy places near sea-coasts.

3. SHAPE AND DEVELOPMENT:—

It is a tall tree, often not very straight, with an open leaf canopy, and much branched, reaching a height of 80 feet and a girth of 8 feet in favourable localities. In Coimbatore trees with 16 feet girth are seen occasionally. It is a slow grower at the beginning and suffers much from fire and grazing. It has a tendency to die back and seedlings if examined will show gnarled appearance as a result of several year's growth. Once established it goes on fairly rapidly. The tree between 500′ and 1500′ is found in good condition. Trees below 500′ and above 3500′ are rather stunted in appearence. It flowers between July and

October and fruits, ripen from December to March. The seeds fall during the dry season and seedlings will have to be protected from forest fires. Grazing is disadvantageous as seedlings are nipped off by cattle. The tree does not seed every year. To attain a girth of 6′ it takes from 124 to 144 years in the natural forest but if planted it may be had in less than 50 years. Such trees are found in the Walayar Knox plantation in Coimbatore district.

4. Reproduction.

The fruit is a samara circular in shape. As it falls in the fire season it is liable to be damaged by fire specially as the membranous wings after drying, readily become inflamable. The seeding is intermittent. Unless the soil is prepared, germination is doubtful. The seeds are easily disseminated by wind as they have wings, and are light. In places having good germination bed, seedlings come up. The seeds retain vitality for a long time. The tree coppices well and on an average puts on a girth increment of 1½″ per annum.

5. Character and Composition of the forest.

It is always found mixed in deciduous forests, its associates being teak, *Terminalias*, *Anogeissus*, *Hardwickia*, *Bambusa etc.* The tree is leafless for a short time during hot weather at the end of which a new flush of leaves appears. It is found up to 8 to 10%. It is not found as a pure crop in its natural state for reasons already stated under "Reproduction."

6. Methods of Treatment.

It is worked under the selection method and in the absence of large areas of concentrated distribution attention does not seem to have been paid to lay out any definite system of working.

7. Sowing and Planting.

The seeds may be dibbled in favourable localities and successful germination can be assured. They have a hard covering which if removed will hasten germination. During the first year the seedling grows to 6″. As already stated it should be rigidly protected from fire and grazing for many years. The Knox plantation in Walayar is an instance of how plantations of this species may be raised successfully.

Part II. Utilization.

1. Identification of Tree.

A tall tree often not very straight and much branched with dark brown and deeply cracked, and rough bark of ⅓″ thick; leaf compound; leaflets 5 to 7 alternate; oblong or obtuse in shape; Flowers bright-orange, giving a sweat scent; appear towards the end of rains. When the bark is blazed a red gum called 'Kino' exudes. Fruit is a samara.

2 Identification of timber.

The heart wood is hard yellowish or reddish brown showing yellowish smooth vertical streaks on a longitudinal section. The wood if moistened and rubbed on a piece of paper leaves a yellowish-brown stain. The sapwood is soft and white. Annual rings distinct, pores in longitutional section contain a reddish yellow substance. Medullary rays are very fine, uniform and equidistant. They are crossed by wavy bands of light tissue.

3. Utility of timber.

Weight 55 lbs and P=718. A durable timber when well seasoned and kept dry. It is liable to be attacked by teredo and so is not fit for ship building (parts coming in contact with sea-water.) It

does not split. The timber may be ordinarily seasoned by stacking it in shady, airy, places. In South India it comes next to Teak and Dalbergia latifolia. It is used for house-building, cabinet making and agricultural purposes. Specially as spokes and felloes for carts.

4. Utility of Minor Products:—The Gum that exudes when the bark is blazed, called 'Kino' is of medical value as an astraingent and for making certain Wines in Europe. This should be collected when the trees are in flowers. Tannin may be extracted from bark. Bark also yields a reddish-fawn colour with tassar silk. Leafexcellent fodder for cattle and also manure leaf.

T. M. Doraisami Pillai.

Forest Exhibition at Cuddapah.

On the occasion of the visit of His Excellency Lord Willingdon to the Cuddapah District in July 1919 an exhibition of Forest Products was held.

The District Forest Officer, Cuddapah North has forwarded the following list of exhibits shown :—

I. Timbers.

1. *Pterocarpus Santalinus*:-Red sanders; The predominant and most valuable tree of the district. It is a very pretty moderate sized tree with an upright clean bole and rounded crown. The wood is extremely hard, dark claret red in colour with black veins, close

grained and weighing 70 lbs., and over, to the cubic foot. * P: 800 to 900. It is extremely valuable and commercially known as redsanders or Red wood. Its disrtibution is very limited, mainly confined to the slopes of the hill ranges of Cuddapah and to the joining parts of Nellore and Chittoor Districts. It is chiefly used for the construction of house posts. Sound posts called 'Specials' are sold at Rs. 15 per cubic foot while in the case of exceptionally good sound posts, the prices fetched go up even to Rs. 80 per pair. The charcoal obtained from this tree is excellent and fuel of the best quality is provided by the branches of badly formed or diseased trees. Small pieces of the heart wood are carved by Settigunta doll makers into dolls and idols which are in great demand among pilgrims to the famous Tirupathi Temple. The wood is also used for agricultural implements and the leaves for fodder. In former days the wood of the redsanders was valued for its red colouring principle, a salmon-pink dye known as "Santalin" which is soluble in alcohol and ether, but not in water. Large quantities of Redwood were exported to Europe for this purpose but it was entirely superceeded in recent times by the introduction of artificial substitutes. The wood powdered and mixed with oil is used for bathing and for purifying the skin, also given internally in hoemorrahages in powders ground up with milk.

2. *Anogeissus latifolia*:-Yelama (Tel). Next to Red-sanders it forms the chief timber of the district. The wood is very heavy weighing 60 lbs., and over, to the cubic foot, of a purplish brown colour and close grained. P. 700 to 800. The wood is also fairly durable but liable to warp and split when seasoning. This tree grows at all elevations in this district chiefly associated with redsanders. The wood is chiefly used for beams, posts, cart poles and agricultural implements.

* P = Co-efficient of transverse strength (i. e.) $\frac{W \times L}{BD^2}$

3. *Hardwickia binata* :-Yepi (Tel). Next in importance to Yelama. It is an extremely heavy, hard, durable wood weighing 70 lbs , and over, to the cubic foot. P. 900 to 1000. Heart wood is dark purple in colour but liable to split when seasoned. It is also cross grained and difficult to be planed smooth. Chiefly used for beams, posts, rafters and cart poles. A kind of fibre is prepared out of the bark of the tender shoots for which the tree is frequently pollarded. On account of the extreme hardness of the wood, trees of large dimensions are generally not felled. Pure forests of Hardwicka binata are met with in the northern portion of Veligondas in Badvel Taluk, elsewhere they are found mixed with Anogeissus latifolia.

4. *Terminalia Tomentosa* :-Innumaddi (Tel). Associated with *Aoegisnsus latifolia* and Redsanders. This tree is met with throughout the greater part of the plateaus and diciduous forests of the district. It is a very heavy, hard wood weighing 60 lbs , and over, to the cubic foot. The wood is dark brown in colour durable, but liable to warp and split when seasoned. P. 800 to 900. Chiefly used for beams, rafters, bedstead, cartpoles and agricultural implements.

5. *Pterocarpus Marsupium*:-Yegi (tel). Next in importance to Redsanders and *Anogeissus latifolia* and generally associated with them. The growth is confined chiefly to places where the soil is fairly deep, found in abundance in Nallamalais, Palakondas and Seshachallam Hills. The wood is very hard, heavy, weighing 50 lbs. and over to the cubic foot. P: 600 to 700. The heart wood is olive brown in colour, very durable, and seasons well. It is chiefly used for beams, scantlings, door and window frames, cartpoles and agricultural implements.

6. *Chloroxylon Swietenia*:-Billu (Tel). This is the 'Satin wood' of commerce found generally as an associate of Redsanders and

yelama and generally distributed throughout the district. The wood is very hard and heavy, weighing 53 lbs., and over, to the cubic foot. P. 900 to 1000. The heart wood is of yellow colour often turning brown, close grained, very durable, seasons fairly well and will stand immersion in water. Used generally for house construction, machinery, furniture, bedsteads tool handles and walking sticks.

7. *Shorea Tumbuggaiya* :—Jalari; tamba; (tel). A large tree found chiefly grown in plateaus of Seshachallam hills. The wood is very hard, heavy, weighing 50 lbs., and over to the cubic foot. P: 700 to 800. Heart wood is brown in colour, very durable but liable to warp when seasoned, Chiefly used for beams, rafters posts and cart poles

8. *Tectona grandis* :— Teak. Teku (Tel). This is met with in higher elevation in Seshachallams, Palakondas, Nallamalais and Lankamalais. Growth is very poor and stunted. Wood is moderately hard, moderately heavy, weighing 40 lbs. and over, to the cubic foot. P. 600 to 700. Heart wood is yellowish brown in colour turning to dark brown, extremely durable, seasons very well. The wood is generally used for door and window frames, posts, furniture, spokes and felloes for carts.

9. *Dalbergia latifolia* :— "Rose Wood"; Jettingi (Tel). An evergreen tree found mostly along stream banks and ravines. The wood is extremely hard, heavy, weighing 50 lbs. and over to the cubic foot. P. 900 to 1000. Heart wood is dark purple in colour with dark red streaks, very durable and seasons well. Chiefly used for door and window frames, furniture and machinery.

10. *Albizzia Lebbek* :— This is called 'East Indian Walnut.'; Darsanaum (Tel). It grows to a fairly large-sized tree, and met with

at low elevations in the district. The wood is hard, heavy, weighing 50 lbs., and over, to the cubic foot. P. 700 to 800. Heart wood is dark brown colour, with light brown streaks, close grained, durable and seasons well. Chiefly used for beams, scantlings, planks, house-posts, machinery and cart poles.

11. *Melia indica*:—'Neem' or 'Margosa.' Vepa (tel). Very largely cultivated but occurs in tarai portions of the forests. Wood is hard, heavy, weighing 50 lbs, of over, to the cubic foot. Heart wood is light brown in colour, durable; seasons fairly well. Generally used for beams, scantlings, planks, door and window framies.

12. *Eugenia jambolana*:—Nerruddi (Tel). An evergreen tree growing to a fairly large size and found throughout the district but confined to the terai portion of the forests and along stream banks Wood moderately hard, moderately heavy, weighing 40 lbs., and over, to the cubic foot. Heart wood is greyish red in colour durable but liable to warp when seasoned. Chiefly used for beams rafters, scantlings, cartpoles and agricultural implements.

13. *Bassia latifolia*:—Ippa (Tel). Met with generally in the plateaus and along stream banks. Wood is hard, very heavy, weighing 60 lbs., and over, to the cubic foot. Heart wood is reddish brown; fairly durable, chiefly used for house posts.

14. *Diospyros melanoxylon*:—Tooki (Tel). Generally met with throughout the district at all elevations but the growth is very stunted. The wood is very hard, very heavy. Heartwood is black in colour, durable, Chiefly valued for its heartwood. The chief demand in this district is for its *leaves* which are collected when they are tender for making *'bidis'* or country cigarettes. The right to collect these leaves is leased out annually for reserved and unreserved lands of this district. Average revenue realised for annum is Rs. 8000.

15. *Terminalia belerica*:—Tandra (Tel) This tree grows fairly large in dismensions and is met with at all elevations but generally where the soil is deep. Wood is hard, moderately heavy weighing 40 lbs. and over to the cubic foot. Colour is yellowish brown, fairly durable. Used for scantlings and planks. Not much in demand in this district.

16. *Mimusops Elengi*:-Pogoda (Tel) Fairly large evergreen tree found chiefly in Seshachallam hills. Wood fairly hard, moderately heavy. Heartwood is of brown colour very tough and elastic, fairly durable. Chiefly used for posts.

17. *Mimusops hexandra*. Pala (Tel). A fairly large tree occurs in conjunction with *Mimusops Elengi*. The wood is fairly hard, moderately heavy, of light brown colour. Fairly durable but liable to split when seasoned Chiefly used for piles and posts.

18. *Shorea Talura*:-Jalari (Tel). A fairly large sized tree growing chiefly in the "Seshachallam hills. Wood fairly hard, heavy weighing 50 lbs., and over, to the cubic foot. Heartwood is yellowish brown in colour seasons fairly well, used as posts, rafters.

19. *Terminalia paniculata*:-Puli, Maddi (Tel). Fairly large tree. Wood fairly hard and heavy, of light yellow colour, seasons fairly well. Used as house posts, beams, rafters etc.

20. *Bridelia retusa*:-Koramaddi (Tel). Found sparsely grown throughout the forests of this district. Wood is light coloured, rather soft, though well adapted for picture frames and such light works.

21. *Dolichandrone crispa*:-Nirrudi. Common throughout the outer slopes of the hills of the District. A softwooded tree useful only for light works.

22. *Holoptelea Integrifolia*:-Found in lower elevations, sometimes cultivated. Fairly large tree. Wood is soft; used only for light works. Excellent for making "Bobbins."

23. *Adina cordifolia*:-Rudrakadapa (Tel); A fairly large sized tree found in higher elevations. Wood moderately hard, moderately heavy weighing 40 lbs. and over, to the cubic foot, yellow in colour, often turning brown, seasons fairly well but liable to warp and split, used as planking posts and for furniture.

24. *Albizza amara*:-A fairly large tree grows at lower elevations Wood yields very good fuel Hard heavy, dark brown in colour, seasons fairly well. Used as posts, rafters and for agricultural implements.

25. *Pterospermum suberifolium*. Tada. (Tel). A middle sized tree found growing along stream banks. Wood moderately hard, heavy. Used as house posts, beams, rafters.

26. *Albizzia odoratissima*:— A middlesized evergreen tree growing along water courses. Wood is hard, heavy, dark brown in colour, close grained, durable and seasons fairly well. Used for beams, posts, rafters.

II. Industrial uses of Wood.

1. *Bamboo Spear Shaft*:— The handle is made of the bamboo "*Dendrocalmus strictus*." This is very widely grown throughout the district and forms the chief species of bamboo. Spear shafts are generally used for hunting pigs. Bamboos of this kind have been largely used for the manufacture of lance staves during the war.

2. *Gandragoddali*:— Long hatchet. This is the local guillotine axe peculiar to this district and largely used in committing

murders. The handle is made of "Satinwood." Intended for self protection.

3. *Bill hooks*:— This is the type of bill hook met with in this district. The handle is made of "Satinwood."

4. *Articles made of Redwood*:— Images and dolls shown here are made of Red sanders, in and round Settigunta. It has a great demand among pilgrims going to Tirupati. The other articles exhibited are red wood panel, despatch box, cups, jugs and spoons.

5. *Articles made of white wood*:— The chief wood used in in making dolls, cups, jugs, etc., exhibited here is '*Wrightia tinctoria*'. This is a fairly large sized soft wooded tree. Grows in the terrai portion of the forest and round margins of cultivation.

6. Three different kinds of combs exhibited here One, 'rough' next 'fine' and the third 'fine with contrivance for drawing the oil.' The chief wood used in making these is '*Gardenia Lucida*' (Yerra bikki, Tel) This is a soft wooded tree growing along the outer slopes of the hills of this district. Other woods which are being used for making combs are '*Wrightia tinctoria*' and '*redwood*' Combs are made by a class of people called 'Dommaras' who are generally met with near Bathur and Onipenta in Cuddapah and Proddutur Taluqs.

7. *Walking sticks*:— Certain species of timber growing in the forests are selected for making walking sticks, some on account of their ornamental appearance and fragrance and some owing to their straightness and toughness. Of the former here exhibited are sandalwood, redsanders, rosewood and '*Maba buxifolia*' (Uti Tel). Of the latter are *Chloroxylon Swietenia* (billu. Tel). and *Grewia*.

8. *Types of local Musical instruments : –*

(a) Long flute made of the male bamboo '*Dendrocalamus strictus.*'

(b) Short flute made similar to above.

(c) Nagaswaram flute made of the bottle gourd.

9. ***Butter milk churner*** :—This is made of bamboo and largely used in the villages.

10. ***Agricultnral implements*** :—Some of the implements used in this district especially those made of redsanders are exhibited.

11. *Machinery*:—Redsanders Weaving Loom and bobbin. Used by weavers of Madhavaraur, Pullempet etc.

III Grasses.

Various kinds of grasses grown in the hills of the District with their Vernacular names are exhibited here.

1. ***Botha and spear grass*** :—These two grasses belong to the 'Andropogon' family. Met with throughout the district on slopes and plateaus. Generally used for thatching purposes. The previlege of cutting grass in the reserved forests of this district is given free to the villagers and removals are effected annually to a very large extent. During the last two years manufacture of hay was undertaken by the department for the supply to the Army, the total quantity supplied amounting to as much as 2000 tons. Specimen of a bale supplied is exhibited here

2. *Broom grass* :—* This kind of grass is generally met with along stream banks and alluvial soil. These are used for making brooms and sold at annas six per dozen.

IV. Fibres

1. *Yeri fibre*:—Hardwicka binata: Suitable kind of fibre is made out of the tender shoots of this tree for which they are frequently pollarded The various stages in which the fibre is made are exhibited here. The industry is confined chiefly to northern part of Badvel Taluk where the tree grows in abundance.

2. *Agave fibre* :—This is the "Aloe fibre of commerce" Good quality of fibre is made out of this. Various stages in which they are made are exhibited here. The plant is commonly cultivated as a hedge-plant.

3. *Kondapathi* (*Thespesia Lampas.*) A coarse kind of fibre is made of this shrub; used as cordage.

4. *Tella Jelledo* (*Calotropis Gigantea.*) This is a shrub met with on waste lands and on sandy soil This yields a very good fibre used as cordage.

5 *Grewia tiliæfolia.* Tada This is a shrub commonly met with along stream banks, yields a coarse kind of fibre used as cordage.

6 *Sansiviera Sizanoides.* This resembles the 'agave,' grows as undergrowth in the forests, yields a good quality of fibre used as cordage

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* | Aristidia setacea. Editor.]

V Flosses

1. *Bombax malabaricum.* This is the silk cotton tree found almost throughout the district. Sometimes cultivated. The fruit yields a kind of floss, coarse white in colour, used for stuffing pillows and beds. Collection is made in the months of March and April when the capsules burst open and the winged seeds are blown about by wind.

2. *Kondapathipullulu.* (*Thespesia Lampas*) This is a shrub. Grows commonly as an undergrowth, widely distributed throughout the forest of Veligondas in Badvel Taluk The Ca-psules resemble that of ordinary cultivated cotton and a kind of floss though inferior in quality is produced. Collections are done in April, May and June, and the right of collection of the same is leased out annually in the North Division. Average Revenue realised is Rs. 150. The floss is used for stuffing pillows and beds.

VI. Oil Seeds.

1 *Bassia latifolia.* Ippa (Tel). A kind of oil is extracted from the seeds of this tree. The oil is used for cooking and burning by poor people. It is also used for soap-making.

9. *Pongamia glabra.* Kanuga (Tel). This is an evergreen tree growing to a large size along stream banks; sometimes cultivated for its leaf which is used for manure. The fruit is a flat pod containing a reddish brown seed. An oil is extracted from this seed which is largely used in medicine and also for lighting. It is a somewhat poor lighting oil and is therefore chiefly mixed with sesamum oil for this purpose.

3. *Melia indica* (Neem Vepa (Tel) This tree is extensively cultivated for its seed from which a bitter acrid oil is extracted by boiling or by pressure. It is largely used medicinally and sometimes for burning, but smokes disagreeably.

VII. Tans and Dyes

1. *Cassia auriculata.* 'Tangedu bark' or 'Turwad' (Hind). This is the best of all tanning barks met with in South India. Grows wild as a shrub throughout the district. Leather tanned in all stages with Tangedu bark was exhibited There is very large demand for this bark among the tanners of Chittoor and North Arcot districts. The right of collection of this bark for reserved and unreserved lands is leased out annually by the Department. The average revenue realised is Rs. 20,000.

2. *Cassia fistula.* Rela (Tel). Next in demand to Tangedu. This is an ever-green tree growing throughout the forests of this district. The tanning property of this bark is not so good as Tangedu. The right of collecting the bark was restricted in pre-war days but was extensively given out as a war measure during the last two years.

3. *Anogeissus latifolia.* Yelama (Tel). The bark of this tree is a good tanning agent. A large quantity of this was collected in this district for supply to the Controiler last year.

4. *Sumac.* This is the red and green leaves of *Anogeissus latifolia* or Yelama dried and powdered. The leaves are plucked when they are tender. Red Sumac is considered to contain a high percentage of tannin, and equal in all respects to Tangedu. Tanning leather with sumac is now in an experimental stage.

5. *Redsanders.* The wood of redsanders gives a colouring matter or salmon pink dye called 'Santalin.'

6. *Morinda tinctoria.* Maddi (Tel). The bark of the root gives a red and yellow dye. Sample of dye prepared out of this is also exhibited here.

7. * *Mallotus philippinensis.* The fruit of this tree produces what is known as the 'Kamela' dye of commerce It is obtained from the red glands on the surface of the fruits either in a dry state by shaking the capsules in a bag, or in a wet state by stirring them in water and collecting the sediment in the form of cakes. The dye is used chiefly for dyeing silk a bright orange colour but as the cost of collection is high this dye cannot compete with artificial dyes.

7. *Zizyphus xylopyra.* Gotti (Tel).

This is a small tree or large shrub distributed throughout the district. The fruit of this tree when ripe contains a large percentage of tannin. Tanning of leather with this however is in an experimental stage.

8. *Myrabolans.* These are the fruits of *Terminalia chebula* (Karaka, Tel., and Terminalia belerica (Tandra, Tel).

These fruits are rich in tannin and are used for tanning and dye.

9. *Lawsonia alba.* Mundi. Shrub grown as hedges. The 'Henna' dye used for dyeing the nails, skin and beard is obtained from the leaves. Sample of dye is also exhibited here.

VIII. Oils and Tars.

Erythroxylon monogynum. Devadaru (Tel.)

This is called the 'bastard sandal.' This is a semi evergreen shrub or a small tree growing at lower elevation throughout the district. The wood when burnt gives out smoke which has a slight fragrance resembling that of sandal. A kind of tar is distilled out of this by destructive distillation which is used for hoof disease in cattle.

IX. Gums and Resins.

1. *Boswellia Serrata.* Andaka (Tel). An exudation from the bark of this tree yields a transparent gum-resin which is used in medicine and also burnt, as iesense. This is grown largely throughout the district especially in Nallamalais.

2. *Pterocarpus marsupium.* Yegi (Tel). This tree yields the 'gum kino' of commerce, a bright red astringent gum resin much used in medicine.

3. *Butea frondosa.* Moduga (Tel). Exudation from the bark of this tree yields a ruby coloured gum called 'Bengal Kino.' It is soluble in water and used as an astringent in medicine.

4. *Anogeissus latifolia.* Yelama (Tel) This tree produces a gum much used in calico printing It is inferior in strength to *gum arabic* for adhesive purposes.

5. *Cochlospermum gossypium* This tree yields a white gum called 'Katir' insoluble in water, much used in medicine and largely by shoe makers.

6. *Odina wodier.* Gumpan (Tel). This tree yields a brown, clear brittle gum used in paper-sizing, cloth-printing and in medicine. It is soluble in twice its weight of water.

7. *Bombax malabaricum.* Booruga (Tel). This yields a course kind of gum used for adhesive purposes.

X. Drugs, spices and poisons.

1. *Butea frondosa* Moduga (Tel). The *seeds* are used as a ver-

mifuge for elephants and horses. Largely grown in the northern parts of Badvel Taluk.

2. *Ægle marmelos.* Maredu (Tel)

The pulp of *fruit* is used in dysentry and also as a laxative. The fruit when ripe and mixed with juice of tamarind forms an agreeable drink.

3. *Strychnos nux-vomica.* Mushti (Tel).

The *fruit* is a large orange coloured berry containing a pulp in which the round flat silvery seeds are imbedded. The *seeds* yield the alkaloids strychnine and brucoine. The seeds are given in leprosy, paralysis, and bites of venomous serpents.

4. *Strychnos potatorum,* Tella ginjalu (Tel.)

The dried *seeds* are used for clearing muddy water; powdered and mixed with honey they are applied to boils to hasten suppuration.

5. *Abrus precatorius.* Guruginja (Tel.)

The small red *seeds* of this climber are well known as gold-smiths' weights and containing a violent poison which is sometimes put to criminal use particularly in the poisoning of cattle by hide contractors. The seeds are ground down to a paste with a little cold water and made up into small pointed cylinders which inserted below the skin of a human being or of a grazing animal causes death in a few hours. The poison is akin to that of snakes. White and light red seeds were exhibited.

6. *Asparagus racemosus.* (Tel). Chilla. The *root* of this is boiled in milk and given in bilious affections.

7. *Mahuwa bark.* Used as a tonic in fevers.

8. *Carthamus tinctorius.* Kusuma (Tel).

An *oil*, of light yellow colour is procured from the *seeds*. This is used for lamps and culinary purposes and also in rheumatic and paralytic complaints.

9. *Citrullus colocynthis.* Putsakaya (Tel).

Colocynth plant largely grown on waste lands. The *fruit* is used in medicine and contains a bitter and poisonous principle called 'Colocynthin.' An oil is extracted from the seeds and used for lamps. Its chief use is in medicine in constipation.

10. *Hemidesmus indicus.* Sugandhapala (Tel). Sarasaparilla. The bark of the *root* is used in medicine for purifying blood, and largely used as tonic.

11. *Scilla indica.* Adivi Thellagoddalu (Tel).

The bulbous *root* of this plant is chiefly used for horses in case of strangulation and fever and also when burnt is applied to the soles of the feet when suffering with a burning sensation. Largely grown in sandy plains.

12. *Randia dumetorum.* Manga (Tel). The fruit is used as a fish poison. When bruised and thrown in the ponds where fish are, they are soon intoxicated and seen floating.

13. *Feronia elephantum.* Woodapple. The pulp of the fruit is edible. A kind of gum exudes from this tree which is used for dyeing and medicinally when mixed with honey.

14. *Cassia obtusa* Senna *leaves.*

Grown wild, sometimes cultivated. The leaves are used as purgative.

15. *Cæsalpinia bonducella.* Gachakai (Tel).

Fruits These are pounded and used as a tonic and febrifuge.

16. *Limonia acidissima.* Munukudu (Tel).

The dried fruits are tonic and considered an excellent antidote to various poisons.

17. *Holarrhena antidysenterica.* Kolamukhi (Tel).

A common flowering shrub. The *bark* has astringent and tonic properties and is a remedy in fevers.

18. *Jatropha curcas.* Adivi amica. (Tel).

The *seeds* give an oil which is externally applied for rheumatism.

19. *Curculaga archioides.* Nelathattigadda (Tel).

The *root* is bitter and aromatic and is considered a demulcent. It is used ie Gonorrhœa and also has tonic qualities.

20. *Clerodendron inerme.* Nallauppi (Tel).

The juice of the *root* is bitter and occasionally used in scrofulous complaints.

21. *Arura montanum.* Kondaragi (Tel.)

The *root* is employed to poison tigers.

22. *Gardenia gummifera.* Manchibikki (Tel).

The *buds* give a yellow resin useful for keeping off flies from sores.

23. *Strychnos colubruna.* Naga mushti.

This tree yields one sort of *Lignum colourinum;* esteemed as an infallible remedy in the bite of the Naga snake.

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XI. Edible products.

1. *Buchanania latifolia.* Sarapappu (Tel.)

The tree is widely grown throughout the forests of the district. The fruits contain *seeds* called 'Cuddapah nuts' which are largely eaten.

XII. Miscellaneous Products.

1. *Mats.* Mats made of date leaves exhibited.

2. *Acacia leucophlœa.* Tella Thumma (Tel).

The bark is used for clarifying toddy of the palmyra palm.

3. *Plate leaves.* These are chiefly made of the leaves of *Moduga, Tadu* and *Bauhinia vahlii* which is a large climber.

4. *Diospyros melanoxylon.* Tooki (Tel).

The leaves are largely collected for making 'Bidi' or country cigarettes.

5. *Sapindus emarginatus.* (Soap-nut tree). Kukadu (Tel).

The fruits are largely used as a substitute for soap.

6. *Albizzia amara.* The powdered leaves are used for taking off oil from the body. A very cooling material.

7. *Honey and wax.* Collected annually from the forests by minor produce contractors.

8. *Pittapie.* Bats' dung or guano:

Collected from the rocky caves of the district. Used as manure for melons of which one variety is exhibited.

9. *Sambar horn.* Collected as a minor forest produce.

10. *Bottle gourd.* Used by the hillmen for drinking water.

Notes on the more important gums and resins of the Madras Presidency.

Gums are products of exudation from Cracks or wounds, and occur chiefly in the Cortex of trees and shrubs. They swell or dissolve in water, but are *insoluble in alcohol or ether.* They are classified into three kinds according as they consist mainly of arabin, bassorin, or Cerasin.

1. *Arabin* is fully soluble in water, forming the best mucilage; "*gum-arabic*" is almost entirely composed of it.

2. *Bassorin* of which *gum-tragacanth* (Astragalus sp:) is mainly composed though but sparingly soluble in water, has the property of absorbing large quantities of water, and swelling up considerably; typical bassorin is not produced by any Indian species, but an inferior kind is obtained from Cochlospermum gossypium, Bombax Malabaricum, etc.

3. *Cerasin* is practically insoluble in water and swells much less than tragacanth. This is largely found in Cherry gum (Prunus).

Resins * are the products of secretion or disintegration of the cells or tissues of plants, usually formed in special cavities or ducts, either

* *Kinos* are resin like substances but soluble in water, astringent and used in medicine and tanning, Eg. *Pterocarpus Marsupium*; *Butea frondosa etc*

in the wood or the Cortex. They are insoluble in water, but *dissolve in alcohol*, ether, or Carbon disulphide, and burn with a sooty flame. They are of three kinds (1) *true resins*, (2) *gum resins* which contain a gum soluble in water, such as, gamboge (*Garcinia*), frankincense (*Boswellia* etc. and (3) *Oleo-resins* or balsams which are more or less fluid, containing an ethereal oil. The "*turpentines*" are balsams obtained from the Coniferae.

The following are among the more important species of the presidency, yielding gum or resin.

1. *Acacia arabica*:— Yields a gum resembling the true 'gum arabic' of commerce; (the latter is from *Acacia Senegal*, a small tree of the arid regions of Sindh, Rajputana, Africa etc.) Used for sizing paper and in medicine.

2. *Acacia leucophloea*:— Gum: good mucilage; often used in adulterating the better classes of gums.

3. *Anogeissus latifolia*:— Gum; light brown; exuding in large tears; extensively used for sizing Calico, and as an inferior mucilage.

4. *Ægle Marmelos*:— Gum yielded by stem *and fruit*; the fruit gum is used in the preparation of varnish, and as a substitute for glue.

5. *Ailanthus malabaricum*:—gum-resin: abundant at Mount Stuart, and tapped during January to March; packed in small bamboo tubes about 9" long, and sells, at 10 to 12 annas per tube, in Coimbatore bazaars; highly fragrant, and burnt as incense, and forms the chief scent ingredient in the preparation of "Vatties" — fine bamboo sticks smeared with a paste of Sandal saw-dust. The fumes like those of

Boswellia serrata are regarded as highly antiseptic and often recommended for influenza patients.

6. *Antiaris toxicaria* :—The Upas tree; exudes a white poisonous resin used for poisoning arrows.

7. *Boswellia serrata* :—gum-resin; transparent, fragrant; burnt as incense, and used as an astringent, and diaphoretic.

8. *Butea frondosa* :— *Kino*; known as "Bengal-kino." Used as an astringent and for purifying indigo.

9. *Bauhinia retusa* :— Yields the 'Semla gum' a clear gum resembling gum arabica; tried at Dehra for aglutinising charcoal powder in the manufacture of charcoal briquettes; occasionally eaten.

10. *Berberis aristata* :— Gum; said to be eaten by hill tribes.

11. *Bombax malabaricum* :-Gum; an inferior type of tragacanth; yellowish brown; used in native medicine.

12. *Buchanania latifolia* :— Gum; not very soluble in water, but affords pretty good mucilage.

13. *Cochlospermum gossypium* :—A better type of gum-tragacanth than Bombax, said to be used in the trade of shoe making.

14. *Canarium strictum* :—Black dammar; used for varnishes, Caulking boats etc., used also medicinally.

15. *Feronia elephantum* :—gum; used for preparing water colours.

16. *Garcinia Morella*;—*gum-resin*; furnishes the true 'gamboge' used for water-colour paints, caste marks, and as a yellow dye.

17. *Garcinia cambogia* :—resin; yellow; soluble in spirits of turpentine; forms a beautiful yellow varnish.

18. *Gardenia lucida* :—yields a yellow resin with a strong smell; used in medicine for skin-diseases.

19. *Gardenia gummifera* :—*the leaf-buds* yield a gum resin.

20. *Odina Wodier* :--Gum; brown, clear, brittle; used in mixing with lime when white washing; soluble in twice its weight of water.

21. *Pterocarpus Marsupium* :— *Kino.* A red gum-resin containing about 75% tannic acid; Copious flow from wounds in the *bark*; * Experiments show that the *wood* also contains a pretty large quantity of the kino; owing to the presence of the latter a damp piece of *Vengai* produces a yellow stain — this forming a rough-and-ready test for the identification of this species wood.

The gum-kino is a valuable astringent and much used in medicine; used by Hindus for caste mark; in Canara as an ointment for diseased horns of cattle.

22. *Shorea robusta* :— *Resin* : whitish, aromatic; transparent,

Treatment of a piece of the *heart wood* with alcohol shows that the wood too is impregnated with a certain quantity of resinous substance.

23. *Soymida febrifuga* : gum; good mucilage.

* (A piece of '*Vengai*' about 3" × 1" × ¾" when dropped into a pint of water was found to stain the water yellow in 10 minutes The solution turned gradually into a darker yellow, then brownish yellow, and ultimately (in about 48 hours) deep red. It is interesting to note that the solution exhibits a kind of fluorescene, appearing deep red by transmitted light, and greenish blue by reflected light).

24. *Shorea Tumbuggaia*:-"green dammar"; used as a substitute for pitch.

25. *Vateria indica*:—Resin; "Piney-resin" or 'white dammar'; Used in preparing varnish; mixed with oil from seeds of *Calophyllum inophyllum*, it is used to caulk native boats on the West Coast. "Can be used as a substitute for Pine, and other resins, imported from Europe, and as a basis for some ointments and plasters" — Pharmacopœia of India.

Mixed with cocoanut oil and rolled into candles; burns with a rather sooty flame.

A more thorough exploitation and investigation of the gums and resins of the Presidency are likely to bring to light many more sources of this type of minor produce, and new industrial uses.

The present yield of this product in the Madras Presidency, whether in quality or quantity, and the lack of such resin-abounding species as of *Pinus* in large numbers do not point to any commercial potentialities, such as the (successful) establishment of the Resin factory at Jallo (near Lahore) in North India. Though it cannot feed, in itself, a factory, the manufacture of adhesives, varnishes, lubricants, medicinal preparations etc, from the local gums & resins can be tacked on as an auxiliary industry to other kindred Forest Industries such as are suggested by Mr. C. Karunakara Menon; (Range officer, South Canara, —in his article on the Industrial uses of Vateria indica; Indian Forester, April 1920 number) viz, preparation of butter from Vateria indica fruits, distillation of Camphor, various oils & tars etc.

G. V.

Extracts.

Extracts from a Memorandum on the Conolly Teak Plantations at Nelambur.

(The Memorandum dated 1877-containing interesting old maps has been presented to the College Library by H. Tireman, Esq, Conservator, Western Circle. Such records are of historical value and will always be welcome additions to the Library).

The Nelambur Teak plantations were first suggested in 1840 by Mr. Conolly, Collector of Malabar, who described their object as being " to replace those Forests which have vanished from private carelessness and rapacity — a work too new, too extensive and too barren of early return to be ever taken up by the native proprietor."

Great difficulty was at first encountered in getting the seed to germinate and many expedients were resorted to. It was argued that in the natural Forest the hard outer covering of the seed was destroyed by the annual fires and it was sought to effect the same object by covering the seed with a light coating of dry grass and setting fire to it. Soaking in water was also tried. In the one case the heat destroyed the vitality of the seed, and in the other the seed rotted. Removing the husk by hand was also tried, it being suggested that it was only the seeds in the forest which happened to be cleaned by white ants that germinated.

The transplantation of selfsown teak saplings had been simultaneously tried but whether from injury to the trees in removal or from attempting to grow too much under shade, or too near mature teak that

had already exhausted the surface soil so far as regarded the constituents of teak, this also proved a failure and Mr. Conolly in a letter of 4th August 1842 reported that of 30,000 seeds sown none had come up and that of 10,000 saplings transplanted more than half had died. Recourse was next had to a Mr. Perrotet, a French Gentleman, Superintendent Botanical Gardens at Pondicherry. His advice was to plunge the seed in water nearly boiling and to uncover the roots of old stumps and cut them in places in order to cause the development of shoots; this experiment came no nearer success.

The true method appears to have been first suggested by Dr Roxburgh at the end of 1843 He advised sowing the seed at the beginning of the rains in shaded beds lightly covered with earth and rotten straw. The present method is given in an addependix and it will be seen that 30 years have added little to the knowledge acquired in 1844 tor except that the seed is sown 2 months before the rain and artificially irrigated so as to give it an additional start the method is substantially the same.

Writing in 1844 Mr. Conolly described the experiment as at an end, and success achieved owing to the extraordinary healthy appearance of the young seedlings, 50,000 of which were raised in May, June and July 1844.

* * *

The Nelambur valley is of the shape of a horse shoe and is elevated about 400 feet above sea leavel. The hills surrounding it on three sides rise in the direction of Sisapara on the S. E. and the Camel's Hump on the N. W. to 8,000 feet while to the N. E. the plateau of S. E. Wynaad which closes it in on that side does not attain an average elevation of more than 3,000 feet. The semicircle of hills overhangs one

vast amphi-theatre of valleys of denudation converging on Nelambur and a great part of the Valley including almost always the river bank to a distance of several hundred yards is an alluvial deposit of enormous depth; the rocks are described by Mr. King as Gneiss of quartzo-felspathic or quartzo-hornblendic variety.

The rain fall is about 120 inches falling chiefly between June 1st and November 1st.* The temperature in shade ranges from 80 to 90 throughout the year and there is a singular absence of high wind all the year round.

The rivers are navigable by rafts up to January, and below Mambat, the most westerly point of the plantation, the navigation is so easy that the largest rafts can be managed by one man. The river which drains the valley empties itself into the sea at Beypore, and 4 miles from the mouth of the river a navigable canal communicates with another river which traverses the heart of the Calicut Bazaar, the best timber market on the west coast. This river is connected with the Calicut roadstead by a bar always open so that the cost of conveying timber from the plantations alongside ship may be regarded as at a minimum.

A good cart road is carried from Calicut through Nelambur up the Carkoor Chaut to S. E. Wynaad whence the main line is carried on to Mysore, with branches on the North to the Devala gold fields and south Wynaad and on the south to the Oughterlony valley and to Ootacamund. The road skirts the plantations for 6 miles, having bridges over the two large rivers.

The climate of Nelambur is tolerably healthy throughout the year. The months of March, April and May are the fever months, but with due precaution fever is seldom contracted at Nelambur itself.

* Rain fall on slopes of surrounding ghauts is probably over 200.

Forests in Malabar are private property and the great bulk of the land in the Nelambur valley is the property of the Nelambur Rajah or Tirumulpad, a wealthy land owner not likely under any circumstances to sell land, still less for the purpose of instituting a local industry of a character to compete with his own agricultural and timber operations for the limited supply of local labour. The plantations owed their existences, to the accident that one of the many religious bodies holding temple lands happened to be in want of funds and to own blocks of land scattered here and there in this valley many of which constituted the very best sites for planting that could have been selected had the whole area been available to choose from.

In considering however the difficulties which had to be contended with, it is necessary to regard as occupying a prominent position, the jealousy of a local Rajah of overpowering influence whose place and Pagoda formed the only point of social attraction in what was otherwise a jungle.

The maps indicate the successive directions in which offorts were made. At first, operations were confined to the narrow strips of river bank west of Nelambur and when in 1853 these appeared to be exhausted a point to the east, further up the river was selected, and became the scene of the operations of that year as well as of 1855 and 56. The mistake was however made of including in the planted area several laterite hills over which the trees signally failed.

Accordingly attention was again turned to the lands down stream and in the vicinity of the earlier plantations on the north bank land was found yielding sites for 1857—1858 inclusive of fair quality some being very good :—In 1860 however exploration had been set on foot further up stream than had hitherto been attempted i. e., above

the junction of the Shurly river with the Karimpoza or main stream. Here there were found several pieces of land included in the Government Estate with first class soil and water carriage which formed a compact block, adopted for further extension on a larger scale. In 1863 Mr. Ferguson arrived, bringing the knowledge of a forester trained in the extensive plantations of Perthshire, and operations were vigorously prosecuted for the ensuing 7 years, i. e., from 1863-69, by which time 619 acres had been planted in this quarter as indicated in the Map by a single red line. The area of suitable land here having been exhausted the experiment was made of further extending at Nellikutta 10 miles up stream and near the base of the hills and here in 1870 and 1871 rather more than 100 acres were planted.

The site however proved so unhealthy that it war abandoned owing to loss of life and invaliding among the establishment, Fortunately at this time an opportunity presented itself of acquiring by purchase a block of land containing some superior planting sites and almost surrounded by Government land planted or in forest. Here operations have been carried on since. In order to make up for the break of continuity caused by the plantings of 1870 and 1871 having been carried out at a site that had to bo abandoned, 235 acres were planted in 1872 so as to bring up the average to 80 acres for the 3 years, which average to 80 acres for the 3 years, which average was maintained during 73 and 74.

During these last 2 years operations had been carried on simultaneously at the newly acquired site at Amrapolliam, so as to open up a different source of labour supply through the village of Wandur and create a basis of operations for further extension at the Karimpoza site. It is however not advisable to go further into these particulars but to confine observations to the area already described, amounting to

2730 acres, the object of this paper being to investigate the actual position of the undertaking, with reference to the ascertained survey areas.

To determine the success of the enterprise the questions to be asked are, what have the plantations cost? What do they now return? What are they likely hereafter to return?

Taking as a basis the calculations made in 1872 at the suggestion of Major Pearson, and adding the subsequent cost the total outlay on the plantations is Rs. 2,29,000 * of which since 1863 a sum of Rs. 1,01,000 has been recouped by thinnings leaving the net cost Rs. 1,28,000. The opponents of planting however maintain that up to the period when interest is returned the cost must include compound interest at 4 per cent on the original outlay.

As a matter of pure calculation of financial results this must be conceded, without however admitting that on the showing of absolute profit thus computed is to depend the question of whether a certain portion of the Forest Revenue is to be returned to the land in view to reproduction of timber.

If the net expenditure of each year is taken and calculated up to 1874, at compound interest the debt against the plantations amounts to Rs. 2,35,000.*

To estimate fairly the position, annual extensions must be kept out of sight, and the capital account closed. In 2 or 3 years there would be no very young plantations unable to take care of themselves and entailing therefore heavy expenditure. The future outlay will then be restricted to fire-tracing, clearing parasites, watching and thinning out of saplings.

* This includes payments for land Viz., in 1840 for lease from Pagoda Committee Rs. 9000, and in 1871 for Chatamburia planting site Rs. 5000.

A third of the existing establishment might be debited to the plantations, leaving the remainder to be divided between the natural forest operations, and extension of plantations on new site.

Altogether an annual expenditure of Rs. 5000 would probably suffice.

An annual revenue from thinnings of Rs. 10,000 would thus cover the upkeep, and pay 4 per cent. current interest on the actual outlay. And the question is do the facts lead to anticipate a steady income of this amount?

Note:—Labour has cost 4 as a day for many years. In the earlier years the cost was larger. It may be roughly estimated that at present rates planting costs Rs. 30 an acre: felling, burning, pitting, planting and once weeding, nurseries and establishment being included.

* * *

During the last few years some saplings have been annually brought to market realising from 5 to 10 Rs. each. This class must undoubtedly increase in number rapidly as the plantations increase in age and here a few remarks may be appropriately introduced as to the system that has hitherto guided the selection of trees for thinning The idea of revenue has been entirely and most wisely ignored the number removed being decided solely with reference to requirements of space and light, inferior trees being invariably if possible removed in preference to superior.

The original planting may be reckoned as giving 1,100 trees to the acre of which a considerable number never make any show, being dwarfed in the first 3 or 4 years by exceptionally vigorous neighbours or perishing from other causes.

The first thinnings are not worth removal The trees remaining per acre at 10, 20 and 30 years may be roughly stated at 750, 500 and 150 respectively.

Thus each tree in a 30 years old plantation represents a selection partly natural, partly in accordance with principles of forestry of 1 in 7.

The further reduction that will ensue is a matter of somewhat uncertain conjecture but if a final crop is taken at 80 years old, a clean cut being then made, block by block, it is estimated that the trees would be of a size to admit of not more than 50 to the acre so that 100 trees per acre would be obtained from a 80 years old plantation before the final crop was taken: timber that would be suitable for minor building purposes, for sleepers and for bridge work of a certain class.

The finding of a market for the ordinary thinnings of the classes before noted is an important consideration and on the success with which the thinnings are brought to market at the right period and judiciously disposed of the income from this source greatly depends.

There is a limit to the extent to which this class of materials can command a local market and it is only the exceptional demand at Calicut that has hitherto admitted of so large an income being obtained. Calicut is a great entrepot for the trade of the Persian Gulf and Arabian Ports and a demand for poles and minor building materials is naturally great from these rainless regions not to mention the demand for materials so suitable as these are for the rigging of Native Craft.

As years advanced of course the numbers of the thinnings of the smaller classes would decrease, but on the whole it is probable that taking into consideration the increase in the larger timber annually removed the revenue would at least maintain itself at 10,000 and thus

simple interest and working expenses be secured till the final crop was realised. It is even likely that this amount may be largley exceeded and any excess will be so much towards extinguishing the debt.

Captain Seton whose estimate is the most careful and business-like of any I have yet seen, calculated the final crop at 100 acres a year of 50 trees to the acre and 50 cub. ft. to the tree, and taking the rates realised at 1, 1½ and 2 Rs. a cubic foot he showed a profit of Rs. 40 per tree or 2 lacs annually.

The figures given in this report show that the average area planted annually for the 30 years has been 91 acres and from this a deduction is necessary to cover spaces where from some cause or another there has been failure or where hereafter failure may occur. Looking at the long period of time that is to elapse the area may from this cause be reduced nearly 25 per cent say to 70 acres. The yield per tree of 50 cub. ft seems a moderate estimate considering that exceptionally fine trees might now be pointed out in parts of the older plantations containing more than half that quantity.*

Supposing the average price to be 1—8, a net profit of Rs. 40 leaves 35 for expenses, or 11 annas a cubic foot. This if applying merely to felling and floating is excessive as it is well known that inferior woods fetching no more than 4 and 5 annas a cubic foot in the Calicut market are profitably removed from Forests further up the same rivers and consequently more expensive to work.

Establishment charge too would dwindle to a very small figure per cubic foot over such extensive operations.

* *Note* :—Mr. Stanborough, Assistant Conservator took measurements in 1874 and calculated on them an average of 1500 cubic feet per acre of timber in the plantations of 1844—1853 inclusive; the maximum of a year being 2500 and minimum 1350. Further measurements and calculations are desirable.

It is doubtless safe to allow a wide margin in such calculations but here there is sufficient to cover not only large excess in cost of operations but also a falling off in the number of trees per acre or in the price realised.

Regarding this last it seems very improbable that at such a distant date, when it may be presumed the natural supply of timber in the market will have so much diminished, an average rate of 1½ Rupees per cubic foot will not be realised by teak of the clean straight sound growth for which the Nelambur valley teak is celebrated, a character which in the plantations promises to be fully maintained.

Colonel Beddome's apprehensions that the quality of the timber will be found in a considerable degree inferior in the market to Annamullay Teak does not seem well grounded,* especially when the absence of heartshake and the economy of working secured by straight growth is considered. A comparison of the conditions under which the two classes of timber can be brought to Market shews what a hopeless disadvantage the Annamullay Teak labours under.

Speaking of the latter in a letter dated 14th May 1875 No. 128 (G. O. Madras Government Public Works Department 6th July 1875) Captain Campbell Walker observes that he doubts whether 1½ Rupees

* *Note*:—Here and there natural Teak trees have been left standing, to the great detriment of saplings planted near them. They are from time to time felled and a batch of such logs was seen by Col. Morgan, Conservator of the Mudamully Teak Forest and Mr. Douglas Conservator of the Anamullies while inspecting in 1872. A fair sample of the batch was judged by these two competent authorities to be some 60 years old and to contain 50 cubic feet of timber worth from its even growth and quality of Rs. 2 a cubic foot in the market depot to which 5 or 6 Rs. would suffice to transport it.

a cubic foot for timber delivered in Coimbatore leaves any profit to the department and Colonel Beddome under date 19th April 1876 (vide same proceedings) wrote that it was very evident that those rates could not be remunerative or even cover working expenses.

In other words the Annamullay Teak, despite its excellent quality, can scarcely be brought to market for the market value owing to the absence of perfect water communication between the Forests and market depot. Hitherto the use of Teak generally for bridge work has been on the west coast greatly discouraged by the difficulty of securing with certainty and with no very long notice a large number of beams of the necessary scantling and hence either inferior sorts of timber are used or iron girders imported.

With these compact areas to work on and the great number and uniformity of growth of the trees it may be fairly expected that Teak for bridgework will be much more extensively used when the plantations begin to mature their crop.

It must be freely admitted that all calculations of this nature are liable to error but making all allowances it seems impossible to resist the conclusion that eventually the result of the plantations must be to contribute to the wants of the country an immense stock of useful material realising such a revenue as fully to reimburse the state for their outlay even after compound interest for the unproductive period is allowed. This result must be deemed a satisfactory outcome of the exertions of Mr. Conolly the zealous pioneer of the enterprize, of the late Chatoo Menon the native Conservator who for 20 years carried on the operations and of Mr. Ferguson whose skilled and unremitting attention during the last 14 years has brought the plantations to their present pitch.

* * *

Appendix.

A. Memorandum on growing Seedlings from Teak Seed, Planting out etc., by Mr. J. Ferguson, Deputy Conservator of forests, Nelambur.

1. Collect seed from trees with a clear stem free from decay and of vigorous growth: February the best month to collect in.

2. *Preparation of Nursery Beds*:— Select good free soil, dig 12 inches deep, removing weeds, roots, and stones; when caked, the soil should be reduced to a fine and the nursery levelled; line off beds 3½ feet wide and one foot space betwixt each bed and its follows, then raise an outer edging round each bed 3 to 4 inches high; beds when thus finished will be about 2½ feet wide between the edgings and 120 seers of seeds will suffice for 150 feet in lengh of the above sized beds; sow from 10th to 15th April; before sowing steep the seed forty eight hours in water, then sow and cover with a thin covering of fine soil nearly ¾ inch, then cover with straw to retain the moisture; betwixt the soil and straw a few very small twigs without leaves to prevent the straw from being washed into the soil by water; which if allowed, is apt to destroy the young seedlings on its (the straw's) removal. Water daily copiously, say a common earthern pot of water to each two running feet in length of bed less or more according to free soil, or otherwise; in this way the seed will germinate in from 10 to 15 or 20 days or more according to freeness of soil; water less as the plant strengthens, but keeping up sufficient moisture till the monsoon sets in from the 1st to the 3rd week in June, when the plants will be from 4 to 8 inches high and ready for planting out permanently.

3. The site for planting should be selected and felled in December allowed to dry till March, fired, then cross out, piled, and burned off,

and after the soil is softened by the rains, line and mark off the pits the required distance apart; from 6 to 7 feet answers well the pits dug from 10 to 12 inches square and equal depth and filled in as dug with earth slightly raised around tops.

4. *Planting*:—The seedling should be put well down in the pit. taking care the tap root is not twisted and turned up (to prevent which the tap root is shortened to 6 inches as lifted from the bed) when planting the cooly inserts his hand the required depth perpendicularly taking out the soil and putting the seedlings with the other hand (as above without twisting or turning up the root), putting back the removed soil and pressing it firmly round (without damaging) the plant, and this prevents its being wind waved before taking root.

5 Planting should take place after the soil is well saturated with rain; from the 10th to 30th June and 8th July is the best season, as afterwards the seedling's tap root rapidly swells like a carrot and does not throw out fibrous roots, nor establish itself either so quickly or so well as before that state of growth.

6. When the planting cannot be finished by the 8th of July, the small vigorous seedlings which continue to germinate up till August and will even germinate after twelve and fourteen months in the beds, should be selected in preference to the larger and more robust with the carroty roots.

Note by the Officiating Inspector.

I am informed by the Conservator of Forests, Southern Division, Bombay, that he had tried transplanting Teak seedlings in the nursery before planting out with best results, and as this plan mitigates the difficulty to which Mr. Ferguson refers with regard to the long carroty roots, it appears worthy of trial where circumstances admit. The

Conservator of Forests, Southern Division, Bombay, has promised a memorandum on the subject which will be circulated on receipt.

Ootacamund,
26th March 1874.

Sd/ C. WALKER, CAPTAIN,
Offg. Inspector of Forests.

Extracts from a report on the Nelambur Plantations by Col. Beddome dated 1878:—

The report illustrated by large woodcuts showing the actual appearance of the Plantations, is of great interest and forms a valuable addition to the historical records of the College Library.

The following excerpts are specially note-worthy:—

1842 Plantation, area 30·93 acres. This was the first attempt at planting; it is a very irregular plantation compared to any of the others (as there was not a clean fell of the indigenous forests), and the planted teak is mixed with much indigenous teak of rambling growth and some jungle trees, but most of the latter have been felled out by Mr. Ferguson to give light and air to the planted teak. It is in two blocks on opposite sides of the Nelambur river near the palace; the soil near the river-bank is all alluvial and the growth fine, though for a long time it had suffered and been retarded for want of light and air; the rest of the plantation has laterite in the soil, but the growth is fair.

* * *

Three small mahogany seedlings (age one year) are growing very well here, and there is a promising though very young clump of the giant bamboo from Burma.

* * *

Inside but near the edge of this plantation (1868) I came upon some well-grown natural teak trees; one had a splendid straight boll of 75 feet in length and a girth (at 6 feet from the base) of 6 feet, another had a girth of 7 feet 6 inches, and a third a girth of 7 feet 9½ inches with a boll which was forked at about 40 feet from the ground (from injury when young), but the girth very equal and scarcely tapering at all. Mr. Ferguson assured me that the largest of these trees was not over 4 feet in girth when he planted the site, but that they were very much shut out from light and air at that time by large jungle trees, and that the grouth since he had felled for opening the plantations had been watched by him as he had been attracted by its wonderful rapidity.

* * *

1870 plantation, area 74·23 acres: This is in the Nellicootah Block, which is much nearer the base of the hills than Nelambur, the soil and forest growth are much finer than anything at Nelambur, the former is more like that of our best hill forests, such as the Anamallays, with a considerable mixture of gneiss and little or no laterite. Shortly after this was opened and the soil disturbed the locality proved exceedingly feverish; planting was, however, persevered in for 2 years, but the whole of the Nelambur establishment became quite disorganised, and Mr. Ferguson suffered so in health that he was finally obliged to seek a chance to Scotland.

Wild elephants have the run of these Nellicootah plantations and do very great damage. Besides the injury from elephants, deer, &c., it has been impossible to attempt to keep them clear of the rank growth of shrubs, weeds, and creepers, or to attend to pruning, both so important with reference to the admission of sufficient light and air. Fire has however been kept out, and notwithstanding the disadvantages

I believe we shall eventually see some finer growth here than anywhere else in Nelambur, and probably timber of a better quality.

A general weeding took place in 1872 and again in July 1876, but this and the next plantation have not been touched, since, and there is now a rank growth of shrubs (chiefly Desmodium cephalotes and Helicteres isora) 6 to 10 feet high, weeds, grass and creepers, which must retard the growth of the young teak, but the teak trees, when they grow up, will in time keep this down.

* * *

The 25 acres alluvial on the river bank shows splendid growth, but unless arrangements be made to catch or drive away the wild elephants it will have to be classed as 3/5 instead of Full, as Mr. Ferguson estimates the damage of late at about 40 per cent, and it is increasing and the animals becoming very impudent and troublesome.

* * *

1871 Plantation, not surveyed, area (approximate) 46 acres at Nellicootah. The remarks under the 1870 Plantation apply equally to this.

This is an exceedingly good plantation, the growth has a sturdier look than any thing at Nelambur, but there is much damage from wild elephants, which is on the increase.

* * *

1876 Plantation, area (not surveyed) 149 acres. In three blocks at Amarapolliam; 1st block on the right bank of Kudrapoya, 2nd block separated from No. 1 by paddy fields, 3rd block on left bank of Cherapoya.

* * *

The Jungle and forest on the whole of the site was felled and burnt in 1874 and not planted till 1876 owing to a want of plants; this has never occured elsewhere, and only happened owing to a change at the time in the officers in charge. A rank growth sprang up between the burn and the plant, and this took so much out of the surface soil that the young seedlings would not grow properly; (it is just the same with coffee if there be a delay in planting after the burn and weeds be allowed to grow). 1876 was also a very poor monsoon; this block is therefore a wretched failure at present, but Mr. Ferguson is going to replant all casualities.

* * *

There are many thousand indigenous and planted blackwood saplings and trees about the plantations, estimated by Mr. Ferguson at about 80,000, of which probably 30,000 can be grown to a profit and will some day yield a very considerable revenue.

At about 30 years of age the saplings begin to stop growing in height, at least to any perceptible degree, and they begin to add very rapidly to their bulk; they also taper very much till this period, but soon after they stop growing in height the boll swells considerably upwards and the thickness becomes much more equal throughout.

Completely overtopped trees never come to anything in the struggle and should always be thinned out as soon as possible; they are however, often left a few years standing if the market for saplings be slack or if there be any difficulty about labour.

The largest and finest trees are almost always on the out-skirts of the plantations, at least up to a certain age, or whilst the trees stand close, which shows how necessary light and air is; but it is also remarkable to see how a few trees on every acre all over the areas take the

lead and far outstrip their neighbours In the older plantations where the trees are now standing at about 100, 120, or 140 only to the acre, many of the inside trees equal or nearly equal the largest on the outskirts; when the plantations are thinned out to hold only the final crop of 60 to the acre, the smaller trees will have disappeared and the growth will be still more uniform.

The trees are all wonderfully straight and with only one stem; a crooked tree, a forked tree, or even a fluted tree is very rarely to be met with; this is of course owing to the complete exclusion of fire, and to the exclusion of cattle and the assistance of the pruning knife whilst they were young, and to absence of creepers and Ficí.

The immense length of boll in every tree will give these plantations an enormous advantage over any teak forest, and the yield here per acre will be out of all proportion to that in any natural forest in India; it however teaches us how much we can improve the yield of our forests by dividing them into blocks, excluding fire and cattle, and paying some attention to pruning whilst the saplings are young.

With such fine prospects before us in these plantations, it may occur to many that it would be better to extend these teak plantations to other districts rather than attempt to conserve forests and exclude cattle; the answer must be that favourable localities are not available. Teak planting on the eastern side of the ghats or anywhere except under the fullest influence of the south-west monsoon does not promise at all well, in fact it may be pronounced a failure; and teak planting on our mountains within the influence of the monsoon (where plenty of land is available) has hitherto been attended with very poor results. The seed is very difficult to germinate, and the young plants are attacked by all sorts of grubs, insects and vermin, and the subsequent growth,

at least up to a certain age, very slow. Then, again, labor is very expensive or often difficult to procure at any price, and there are feverish seasons when supervision is nearly impossible; and last, though not least, the want of water carriage and the expense of transport, along down the foot of the Cochin and Travancore ghats there may be localities nearly as favourable as Nelambur, but I can indicate none belonging to this Government.

During my visit in January 1871 I thought that I perceived signs of premature maturity, and that the prospect of the trees yielding large timber was somewhat doubtful, and though I had the fact before me that fine teak was producing in the surrounding forest when associated with other trees, I was afraid that the crowding together of the teak without other associates might have an injurious effect I was also then doubtful as to any successful growth on the laterite soils, and about that time I consequently wrote disparaging the plantations (vide my letter in Proceedings of the Board of Revenue, dated 18th June 1872). It is since that time that the older plantations have made such a wonderful start as far as the growth in bulk is concerned, the growth previously having been chiefly in height, and it is only in the last 4 or 5 years that the older portions on the better tracts of laterite have proved that they are fully establishing themselves and likely to give a good yield, though very inferior to that on the alluvial. All the trees are now as healthy as could be wished (the dying off of upper branches before observed on some trees having been caused by Loranths), and I have now few doubts whatever with reference to the future, and as will be seen further on, I anticipate an enormous yield and very large profits.

It is of course possible that the crowding together of so many individuals of the same species may induce disease at some future date or result in premature maturity amongst a certain percentage, but I

can only state that there are no signs whatever of this at present, and that I do not myself anticipate any such result.

As a proof of the late rapid development, I may mention that two trees measured by me in March 1873 as 5 feet 10 inches in girth, were measured in May 1876 as 6 feet 1 inch and 5 feet 4 inches, respectively, and in February 1878 they were 6 feet 8 inches and 5 feet 9 inches; and other trees in proximity with the tree now measuring 5 feet 9 inches now equal or exceed it in bulk, whereas they were less than 5 feet 3 inches in 1873.

Vide my Report recorded in G. O., No. 1300, dated 20th September 1876.

* * *

Mr. Ferguson informs me that the Trikalayar Pagoda Trustees have become very dissatisfied with the terms of their lease since the much more favourable terms obtained by the Amrapolliam Rajah, and that they have on several occasions laid to the payment of the 8 anna stamp fee on all saplings felled out in thinning operations, but that the Collector has always overruled the claim. It could not of course be allowed on all saplings, and the intention of the agreement was evidently that it should only be paid on trees felled at maturity for timber. Government, however, might sanction its payment on all saplings over a girth of 6 feet at 6 feet from the ground.

The saplings have sold very well of late years, and the receipts of the plantations have nearly equalled the expenditure; but this year there has been no market for the saplings, and some 30,000 remain unsold at Calicut. This is probably owing to the famine, and I do not anticipate that we shall have a difficulty in selling; the size and quality of the saplings will annually improve, and the receipts should shortly far more than cover all disbursements for establishment and working charges.

Future Prospects.

The age at which the planted teak will come to maturity, the size it will grow to, the quality of the wood, and the price it is likely to demand when thrown into the market in very large quantities are all questions that must be carefully considered with the data now available.

The age at maturity:—This is a question on which there might be much difference of opinion; I believe that the trees on the alluvial will reach maturity at 60 or 80 years, but that they will then stand 40, 50, or 60 years before old age or decay to any extent sets in. Mr. Ferguson agrees with me as to the size that they will reach at about 60 or 70 years, and that there will be large marketable timber then; but he thinks that the trees will probably go on growing till they are 150 years of age, and that they will be able to stand many years after that. Even if this should be the case, it will be more profitable to fell them when they reach a good marketable size, say a quarter girth of 18 to 24 inches, rather than wait for larger growth, though of course, some wood be left for large timber if it was seen that they continued to add to their bulk.

With reference to the trees on the laterite portions classed as 2/5ths and 3/5ths yield, I feel very diffident about giving any decided opinion; but I think that the age of maturity will probably be a good deal longer than that of the trees on the alluvial. These portions of the plantations shuld be very carefully examined every 5 years or so, and careful statistics as to the height and girth and general health recorded.

The size the trees will grow to, and the cubic contents per acre: This question is very exciting and interesting.

The length of Boll:—The first step is, I think, to fix the average length of boll in the older plantations; 95 feet is now about the extreme length. There are many trees far over 80; 50 feet is the shortest to be found of the trees that will be selected for the final crop, and there are very few trees of only this length. The following table shows the measurements of a certain number of the longest, shortest and medium size, taken from trees in the four oldest plantations with a view to getting the average.

* * *

It will be seen that this gives an average of 68 feet and 1 inch in the oldest plantation, 1844; but as most of these trees are still adding slightly, though rather imperceptibly, to their height, and the selection of an equal number of the very shortest trees of only 50 feet being scarcely fair, as there are very few of these, the average may, I think, be fairly fixed at 70 feet for the alluvial.

The average on the laterite does not, I think, promise to be more than 50 or 55 feet, and this is compensated for by only calculating the yield at 2/5ths and 3/5ths, but the trees on those soils are not yet sufficiently matured, I think, to calculate it with any accuracy; they are still growing in height in the oldest portions and have taken a wonderful start this way during the last 4 or 5 years.

The Girth and Cubic contents:—If the table of the measurements of saplings cut as a fair average of those which will stand for the ultimate crop be consulted, it will be seen that the yearly rate of growth was 1″· 2¾ during the first decade, 1″·3 5/12 during the second, and 1″ 9 11/12 during the third; but the rapid growth in bulk has only commenced towards the end of the third decade, when the trees began to stop growing very perceptibly in height, and the average

for the last half of the third decade is at the rate of 2″· 3 1/12 per annum. I anticipate that the rates during the fourth and fifth decades will be at least 4 cubic feet per annum, if not 5 or even 6; the late thinnings, which reduced the trees to about 123 per acre on the older plantations, have, by letting in more light and air and more root room, given a very great spurt to the development, and many trees have, I am convinced by actual measurements, been growing at this rate during the last 2 or 3 years. and when they are felled out to stand only the 60 to the acre, their development will be still more rapid. The specimen sapling cut out of the 1847 Plantation has, Mr. Ferguson informs me, grown by his personal observation fully if not more than 5 cubic feet annually during the last 4 years.

To illustrate the rate of growh as far as the girth is concerned, I forword for submission to the Secretary of State a small cross section of the boll of each of the saplings already alluded to from the plantings of 1873 back to 1844 (30 specimens in all); the bark and some of the outer sapwood is somewhat injured by white-ants, but the heart-wood is in perfect condition.* These specimens can, if necessary, be sawn across again to form two complete sets for different museums; a complete set of much longer specimens was cut from the lower or thicker portion of the boll and forwarded to Calcutta for the Paris Exhibition, but I observe that Doctor Brandis only forwarded half of these, or those of alternate years, and these are to be deposited in the Nancy Forest School in which our Indian Foresters are now trained.

In the 1868 Plantation, as alluded to in my notes of that plantation (vide paragraph 36). I found a natural teak tree 7 feet 9½ inches in girth 6 feet from the base, boll 40 feet long, being forked at that

* These have all been polished on one side, and the rings show clearly the age and annual development.

height (from injury when young), the girth nearly equal throughout. Mr. Ferguson informed me that he had long watched this tree, and that when he planted this site it was a mere sapling, not more than 4 feet in girth, otherwise he would have felled it as he removes all teak trees that will yield a profit as timber from plantation sites as the shade is injurious; it was at that time, with some other small trees near it, much shut in by the dense growth of many jungle trees, but after the felling of the latter and the consequent admission of light and air its development was very rapid. I had this tree felled, and the rings prove that its growth was very slow during its infancy, but very rapid during the last 15 or 23 years; between the age of 12 and 20 and again between 25 and 30 it had evidently received much check, the rings of those periods being exceedingly close and difficult to distinguish; its age is not more than 57 years or less than 55; this gives us good data, but I expect our planted trees to be much more rapid in their growth, for this tree received no attention for 46 years, and was deprived of the necessary amount of light and air and room for development of a good head, and was subject to fires and other rough treatment whilst young, as proved by a certain amount of fluting.

By the table of specimen saplings it will be seen that the sapling cut in the 1847 Plantation had more than 102 cubic feet of marketable timber in it; it was however a mere sapling, its girth round the centre of the boll being only 4 feet 10 inches, girth at 6 feet from the base 5 feet 4 inches, and girth at very base 8 feet 9 inches: if this tree had not been felled and only grew at the same rate during the next 30 years, it would have upwards of 200 cubic feet at 60 years of age, but its rapid development had only set in during the last 2 or 3 years, and the rate of growth during the next 30 years would in all probability far exceed what it has been

during its infancy. This was certainly one amongst the largest trees in the plantations, but there are others equal to it, and many trees carrying 70 cubic feet; it is only however during the last few years that there has been this great development in girth and wonderful promise of large timber. Until the trees began to stop growing in height they were in most cases mere spindles; now there are quantities of trees over 5 feet in girth at 6 feet from the base, and a good sprinkling over 6 feet.

Thanks to immunity from fire and injury by cattle and the destructive influence of creepers, parasites, &c. whilst in their infancy, all the trees are perfectly healthy and there is no sign of disease of any sort, and a fine clean straight growth has been secured by judicious pruning. 60 of the best and largest only of these, which are all fine and healthy, will eventually stand on each acre, and there can be no reasonable doubt that each of these will attain a girth of 8 feet in the centre; we know that this size can be expected from the indigenous growth here and in similar places at the foot of the Travancore ghats, and even if larger dimensions were certain, it would be more profitable to fell at this size or even at a somewhat smaller girth that to wait for further growth except to meet special indents. The rate of growth will not be uniform in any plantation, we know this by experience of the growth up to date; many trees will probably attain this size in 60 years, whilst their neighbours may take 65, 70 or even 80 years to reach it; so we shall never have anything like to a clean cut over of a plantation or of even any acre at a certain date, and as we pay nothing for the land, there will be no object in clearing it rapidly. When the felling of some of the largest trees in the 1844 Plantation commences in 1904, or perhaps somewhat earlier, there will certainly be many trees not sufficiently developed for felling in the same plantation, though some will be quite fit for the axe in some of the

latter plantations, say the next 3 or 4 years, or the plantations of 1845, 46, 47 and 1848.

Cubic contents per Acre:—This can only be considered at present with a very wide margin; allowing our trees to attain a quarter girth of 2 feet in the centre of the boll, our 90 feet trees will give 360 cubic feet of timber and our 60 feet trees 240 cubic feet, and 50 feet trees, which will be scarce, 200 cubic feet; our average boll is, as I have shown, 70 feet, and this gives 280 cubic feet as the average tree, so that if we are guided by figures and present statistics, we shall have 60 trees, averaging 280 cubic feet each, or 16,800 cubic ft; and if we deduct 25 per cent, from this for the chance of disease, windfalls or other causes, 12,600 cubic feet to the acre; this would be enormous compared to the yield per acre in any of our teak forests where the teak has many associates, and where long bolls are the exception and not the rule (owing to various injuries whilst in infancy); *but these trees would be very small compared to some of the gigantic trees which we have felled in the Anamalays, which have given as much as 1,920 cubic feet out of an 80 feet boll*, and I see no reason to doubt that there will be this yield off most acres on the alluvial. I do not, however, wish to make calculations at this high rate, and think it will be sufficient if we allow 6,000 cubic feet per acre as full stock, and it must be certain in that this will be well within the margin, and no trees with our length of boll will ever be felled unless it contains much more than 100 cubic feet. as is proved by the specimen lately felled in the 1847 plantation, which contained 102 cubic feet though a mere sapling.

* *

By this it will be seen that about 120 trees now stand to the acre in the 1844 Plantation, and that the cubical content is 4879 feet

per acre; and in the 1845 Plantation 158 trees carry a cubic content of 4,642 feet, the 1858 Plantation 270 trees, 2202 cubic feet, and the 1868 Plantation 750 trees, 2491 cubic feet.

These measurements must not be taken as illustrating the growth of the final crop, as all but the best 60 per acre will be in time thinned out; the others are only in the meantime acting as nurses.

It will be seen that in one of the two half acres measured in the 1844 Plantation, two trees already carry more than 100 cubic feet.

The Plantation is $6\frac{1}{2}' \times 6\frac{1}{2}'$, which gives 1,040 saplings to the acre.

* * *

It will be seen that Mr. Macgregor estimated only for 2,500 cubic feet per acre or 50 trees at 50 cubic feet each; this was an estimate without any measurements or statistics, and in putting it forward I suppose he followed Captain Seaton's rough estimate of 2,500 cubic feet per acre; but Captain Seaton visited these plantations very many years ago, before the growth was such as to authorize any estimates or anything beyond a rough guess, and he probably had in his mind the yield in teak forests, and certainly can never have calculated for the great length of boll, and I think I have conclusively shewn that no tree at maturity can ever be felled with as small a cubic content as 100 feet, and the measurements and statistics show that we shall probably have 8, 10 or 12,000 cubic feet to the acre at 60 years of age.

* * *

Our oldest plantation is 1844, our youngest 1876; allowing 60 years for maturity, felling commences in 1904, and allowing the trees

to stand 50 years after maturity, felling of the present stock need not cease till 1986; this gives, at the lowest estimate that can be put forward, 14,906, 108 cubic feet as available during these 82 years, or 183,000 cubic feet annually. The stock however might probably stand over one hundred years if necessary, and though I have put down 60 years as the age at which felling is to commence, it is, I may say, certain that there will be much marketable timber available at or soon after 50 years of age. Long before the 60 or even 50 years have expired there would, of course, be accurate plans of all the older plantations, shewing in full detail the size of the trees, &c, and the plantations could be worked by orders from the Conservator's Office wherever it might be.

At present there would be no market at Calicut for 180,000 cubic feet of teak annually, but there need, I think, be no apprehension on this score; when it becomes a certain annual supply, a market will be obtained; it could be sold at such prices that Burma teak could be thrown out of the Madras market, and with good saw machinery either at Nelambur or at Calicut, it could be worked up into scantlings to meet the Government and private demands of a greater portion of this Presidency as well as Bombay.

The quality of the wood:—This has never been tested yet, and it is probable that it may be very inferior to mountain teak, at least for the purposes of furniture; but there can be no doubt about its being good serviceable wood for building and many other purposes, and Mr. Ferguson sells the natural teak grown in the same localities at prices going up as high as Rs. 2—4—0 per cubic foot.

The Price the Timber is likely to realize:—This will probably vary year by year; good sound teak is not procurable now at Calicut under Rs. 1—8—0 to Rupees 2 per cubic feet, and larger prices are

given for long lengths. It is not possible to estimate what the price may be thirty years hence, though I feel sure there will be a great scarcity in the interim; but about that time large quantities will also be maturing in the Anamallays, Wynad and Mudumally. About the future of the Burma market I know nothing. The following statement is Mr. Ferguson's estimate for felling removing and floating timber to Calicut, by which it will be seen that the charges are scarcely over 3 Annas per cubic foot for delivery and storing there from the Nelambur Block, and not 5 annas from Nellicootah and Karampoya; and as Mr. Macgregor says, inferior jungle timbers not fetching more than 4 or 5 Rupees per candy (12½ cubic feet) are felled and floated to Calicut and sold at a profit.

* * *

Considering the very small charges necessary to bring the teak to one of the principal timber markets, I think we may safely value it at 10 annas per cubic foot net profit as it stands in the plantation, and I have little doubt that at any time trees could be marked and sold at that rate (if not for much more), the removers bearing all the expenses of felling and removal. This would represent a profit of upwards of 90,00,000 Rupees on the ultimate or mature crop. Of late the plantations have been nearly paying their expenses by the sale of saplings, and year by year these profits should be greater, and shortly the necessary thinnings will be more of the character of timber than saplings, and will probably pay off all debts (including interest on outlay) against the plantations; but should they not do so when we commence to cut into the mature crop some 20, 25 or 30 years hence, any balance that there may be against the plantations will be rapidly liquidated.

* * *

Extension of planting:—With the certainty that there will be at least 180,000 cubic feet of teak, and probably much more available after 1904, every year for about eighty years, is it desirable to extend the plantations. At present I think not, and that all the services of the establishment should be employed in the up-keep and improvement of the present plantations; replanting need not again begin till about 1900.

Area available for planting:—Within the limits of the Trikalayur Pagoda land, and for which we pay nothing, there is still some land available, viz., in Panyangote there are still about 100 acres good alluvial. In the Pakode Block across the Adianpoya river from Chetamborai there are about 130 acres good alluvial, and in Kanakote across the Eyathod river from Chetamborai nearly 200 acres good alluvial. It seems a pity that these 430 acres should not be planted, as they form a compact block with the rest of the Trikalayur land and we shall have to pay nothing for the land.

In Nellicootah there are 1703·93 acres superb land for planting, but the locality has proved so deadly and so entirely disorganized the whole establishment that I could not recommend our again attempting operations in this quarter. This forest tract, however, should certainly be fire-traced.

At Eddiambodum, on right bank of the Shurliar, north-west of Yeddicarrah there is a block of 300 acres (colored green in Mr. Macgregor's map) belonging to us, but the success of planting here would be doubtful as it is almost certain to be very feverish. Neither can I recommend that planting should be carried out in the Karampoya Block, for which we have paid 60,000 Rupees; the area is 3945. 60 acres, but of this 15 per cent, must be deducted for nullahs, swamps, rocks, &c. I went carefully over this with Mr. Ferguson again this

time, and my views concerning it are still the same as expressed in my letters referred to in paragraph 72. It is splendid soil, but the forest is too good to fell, and from its close proximity to the hills I feel sure it will prove quite as unhealthy as Nellicootah directly the soil is broken up. Another serious drawback is that the wild elephants are here so numerous and impudent that Mr. Ferguson thinks planting would be a failure, unless we had an elephant trench 6′ × 6′ all round, which would cost at least Rupees 20,000. I am of opinion that the tract should be fire-traced and treated as a natural forest. Most of the fine teak was felled out before we purchased, but there is plenty coming on mixed with much fine jungle timber which, however, is not of very much value here (though it may be during the next 30 years when teak will certainly be scarce), and the growth of the teak will be greatly benefitted and increased by fire-tracing.

When the older plantations are thinned out to 60 trees to the acre there will, I think, be plenty of light and air to raise a second crop between the trees. The alluvial soil is much improving from the annual debris enriching it, and we could avoid all laterite tracts and select only the best ground. 400 seedlings per acre might be planted the usual distance apart; of course many of these would come to nothing, but be required as nurses to draw up those destined for the second crop. It would be an experiment only and the success somewhat doubtful, so should at first only be tried on a small scale.

The cost of collecting seed, preparing nurseries, germinating and planting out and maintenance for the first year would not exceed 7 Rupees per acre, and subsequent up-keep, weeding and pruning about 1½ Rupees per acre.

Mahogany grows so splendidly in the climate of Nelambur and in amongst the teak trees (not objecting to shade) that I strongly

recommend a quantity of seed being procured. It should be sent direct from the Honduras (or at least not be allowed to be detained in England as a former supply was). The seeds should be taken out of the capsules and packed in a mixture of dry saw dust and charcoal dust or dry silver sand and charcoal dust.

* * *

I cannot close this report without testifying to the unremitting care and attention that Mr. Ferguson has given to these plantations during the last 16 years, and I do not think that they would be in the fine condition they now are unless we had the advantage of his practical knowledge of pruning, thinning, &c. Mr. Ferguson's health has been much broken by the fever contracted at Nellicootah and he purposes retiring shortly, and he is afraid that his health will not allow him to pursue his profession in England, and he is no longer young. I trust that the Secretary of State may be asked to consider his claim to pension as a special case, for I think that he should receive, one of £ 250 per annum.

The work of this range is very different to anything else in the department, and the officer in charge cannot to justice to the work unless he is out a great deal himself during the day and able to bear a great deal of exposure; in fact we want a fairly educated man of the working class, who thoroughly understands timber and plantations, rather than a Deputy Conservator and gentleman. Nelambur itself is not apparently feverish, though some of its surroundings, like Nellicootah, are very much so, but the climate is most trying and like a steam-bath all the year round, and the place is perfectly isolated from all society and quite an inhospitable region. I would recommend that a forester be procured from Scotland and placed under Mr. Ferguson to learn his work before the latter leaves; he should be under a special agreement to serve

15 or 20 years; he should receive at the rate of £ 150 per annum whilst learning under Mr. Ferguson, but he should receive not less than £ 250 per annum afterwards for the first five years, £ 300 for the next 5, £ 400 when 10 years' service, and £ 500 when 15 years, or on a scale somewhat similar; and he should be allowed a pension of £ 250 after 20 years. Doctor Cleghorn or Colonel Pearson would be able to select a man; he must be of strong constitution and active habits to stand the work and exposure, and must be fairly educated to be able to keep the accounts and conduct the office work, and he should have a thoroughly practical knowledge of timber and the treatment of plantations; the rest he can quickly learn under Mr. Ferguson.

Sd. R. H Beddome, Lieut-Colonel,
Conservator of Forests

* * *

The proposal that all Forest Officers who have anything to do with teak plantations should be allowed to visit Nelambur and spend a fortnight or three weeks in going through the plantations commends itself strongly to the Board, and they consider that Rupees 4,000 will be well laid out on the construction of a new building to permit of the utilization of the advantages offered by Nelambur as a school of forestry.

The proposal in paragraph 116 for the selection of a new forester has the Board's support, and they would commend Mr. Ferguson's pensionary claims to the liberal consideration of Government.

* * *

Extension of planting:—Colonel Beddome concludes his report with discussing the question of the extension of planting operations. Land is available, though much of this for different reasons he considers

In compartment No. 5 we marked a sample plot of ½ an acre and conducted thinnings as desired by the Conservator, western circle. The object is not only to relieve congestion, and direction of all available food material to one shoot, but also to allow that amount of space that would be neeessary for the growth and expansion of the retained shoots. The difficulty in the way of carrying out such thinnings in all areas is the cost in the first place. It is however anticipated that the cost may be met from the sale of leaves, and wood felled. The thinnings done over half an acre cost Rs. 7—8—0, and the anticipated revenue by sale of produce realised is about Rs. 10 to Rs. 12.

In compartment No. 3 of Coonoor Peak we witnessed the felling of 2 Eucalyptus trees of 157 and 177 feet height. In felling the trees the side along which the tree should fall is first marked in the ground by two pegs and on that side a cut is made with saw to a depth of two inches. Then with an axe a deep cut is made by chopping off the wood on the upper side of the saw cut. Then the tree is sawn from the opposite side a little above the level of the other saw cut. When they have sawn very near the centre of the tree, wedges (steel) are introduced at the mouth of the saw cut and hammered. This to some extent tilts the tree, and the saw is released, so that the sawyers may continue sawing till the tree shows signs of falling. In the case of one tree the sawyers had done a mistake by not making a sufficiently deep notch with the result that the stem was torn in the middle to some length.

(b) *Newman Plantation.* These were planted in 1870 and no felling took place owing to transport difficulties. Recently they have begun thinnings in the plantations, and the produce is being converted into charcoal, and sold at Wellington. The trees in the plantations are grown closely and are devoid of side branches. In comparison with other trees of about the same age elsewhere it is noteworthy to see that girth

growth has been sacrificed here for height growth owing to over-crowding and consequent check of crown development. In making thinnings here the following principles are adopted. First of all the officer deputed to mark out for thinnings selects the final trees and the trees in the dominant and subdominant stage, which directly interfere with the final crop are marked out for removal. Heavy thinnings are out of place here as the area is exposed to North East wind. We have marked out trees for thinnings in compartment No. IV and were taught what trees should be selected for final crop and what should be thinned out.

In Rallia plantation we were shown the mixed planting of *Pinus longifolia* and *Frenela Rhomboidea* 6 feet apart in alternate rows. These were planted between 1889 and 1892 and no thinnings were carried out. Frenela over-topped Pinus and suppressed it. Apart from the poor soil, the mixture of these two species has been found to be bad, and the result is that none of the two has fared well. It is suggested that Frenela may be felled and removed, leaving Pinus alone.

The burning of charcoal in the Newman Plantation is done in octogonal brick kilns. There are two such kilns. The kiln is 10′ in diameter and 7 feet high, 7 vent holes below, and 4 above; of the 8 sides 7 are built of brick in mud mortar, and one side is meant for door-way. The top of the kiln is covered with an iron sheet resting on crossed iron bars. The wood used is Eucalyptus, and any other wood of the same density might be used. Billets 3′ in length and 18 inches in girth alone are to be used, billets of greater girth being split before use. 360 stacked cft. or 4½ tons of wood is put in a kiln at one time. In arranging the billets the lower 2 rows are stacked vertically and the 3rd layer horizontally. Again the thicker pieces are put in the centre and thinner pieces along the edge. After stuffing the kiln all the 7 vent holes below, and the 4 above are kept open and the doorway is fitted

with a zinc sheet and the sides well plastered with mud & mortar, so as not to let in air. The kiln is lit through vent holes, and watched. When flame comes through vent holes all are closed with mud. Carbonization takes place in 4 days, and the kiln cools in the 5th day; or the 6th day it is opened and charcoal taken out and spread in the cooling shed. Then it is filled up in gunny bags at 56 lbs, and then carted to Wellington for sale. In the kiln we have opened, the charcoal amounted to 24-7% and 73 cft. of unburnt charred wood, which mostly consisted of big pieces of wood, stacked in the kiln without splitting. Again we filled a kiln with 393 cft. of wood and lit it. The expenditure for one kiln including all charges viz, felling & stacking, burning, carting to Wellington comes to Rs. 24—13—8, and the revenue realised is Rs. 41—11—6 which gives a net profit of Rs. 16—13—10 or Rs. 15 a ton of charcoal burnt. This of course excluded seigniorage on wood. The method adopted is very simple and no waste is caused. Wherever there is large demand for charcoal this method may be safely adopted.

Keti Experimental Timber Plantation. This plantation which consists of various kinds of Eucalyptus come out of the efforts of Sir Francis Spring so that they may be used as Ry sleepers as in Australia. The period of durability as sleeper varies from 16 to 25 years for different kinds of Eucalyptus. The species planted are (1) *Paniculata*, (2) *cydrophelea*, (3) *Crebra*, (4) *Propinqua*, (5) *Punctata*, (6) *Eugeonoides*, (7) *Aemenoides*, (8) *Hemiphloea*, & (9) *Pillularis*. So as to find out whether altitude may have any influence on their growth, and durability plantations, have been started at 3 places at different altitudes (viz) Keti 6700′; Aramby 7300′ and Snowdon 8500.′ It is said that the Plantation at Keti is the best of all. These plantations were planted from 1911, and *Eucalyptus paniculata* is the best of all. Next in order come *punctata* and *propinqua*. Eucalyptus Hemiphloea is bad.

Sims Park. We visited the Sims Park on many occasions and studied various shola and exotic species, advantage being taken of the names of plants and their natural order given on labels.

Final Survey Examination. About half the No. of days of our stay were spent in the Final Survey practical Examination. Each student was given a plot varying from 15 to 20 acres according to locality The country being hilly, some difficulty was felt. The outer traverse should be surveyed with Prismatic compass and the interior details such as streams, compartment lines, marshes, swamps, roads etc, should be done by plane table. Six days were allowed for field work and the students' work was checked in the field by Messrs. R. B. Cornwell, and Abdul Karim. The remaining days were spent in drawing the Final Survey Plate.

Engineering Excursions. Mr. Cornwell took us to Hill roads, and explained to us the principles of their construction; various bridges were shown including the 3 span girder bridge (Wellington Black Bridge).

General. The site where the students were camping in previous years was a private and a rented one But now a site was selected at Bandy shola in Bandy shola R. F. and some expenditure was incurred in preparing the camp site. All the students raised small camp gardens in front of their tents and student K. G. Monnappa is to be congratulated not only for having started the idea but for getting up a "lovely little garden" as expressed by Mrs Cox during her visit. The water supply was from a small spring which was fenced with barbed wire so as to keep it free from contamination. The general health of the camp may be said to be very satisfactory and this was in no small measure due to the excellent sanitary condition maintained in the camp as a result of constant inspection by Mr. C. C. Wilson B. A. I. F. S., our

it inadvisable to plant. He would not, it seems, enlarge the planted area until the year 1900, though he would apparently commence to raise a second crop on some of the land already occupied when the trees on it are reduced to their final number of sixty per acre.

The Board of Revenue point out that it will not be necessary as far as the timber is concerned to spread felling over so long a period as eighty-two years, and that if it is to be carried out more expeditiously it may be advisable to undertake further planting.

The question is one of great difficulty, and time and further discussion are in the opinion of Government necessary to its decision. At present the Conservator states there would not be a market at Calicut for an annual harvest of Teak of the extent expected, and some experience as to the quality of the timber seems necessary.

Of the other matters touched on by the Conservator in his report, some are already before Government, and the others should be separately reported for their orders.

The Senior Division Camp, Coonoor.

The Students of the Senior Division of the College camped at Bandy Shola, Coonoor, from the 6th April 1920 to 19th May 1920 for full 6 weeks. During the last year our Seniors stopped here for one month, and we derived much benefit owing to a longer stay. After a few days of our getting in we had light showers in the evenings, and the whole time was anything but enjoyable.

During our stay at Coonoor we visited various plantations and studied their working. A brief description of what we saw and learnt is given below :—

(a) *Coonoor Peak.* This area partly consists of pure *Eucalyptus globulus*, and party Conifers. The Eucalyptus plantation was raised during 1872—73 with the object of meeting the demand for fuel in Coonoor and Wellington. At the same time private men also raised plantations Before the Government areas could be worked out, private men who could not in the majority of cases afford to wait for financial exploitability felled their trees and flooded the markets with fuel with the result that Govt. could not compete with them. So the plantations which were originally intended for clear felling had to be worked under coppice with standards, so that only a limited quantity of produce may be sent to the market. During 1917—19, however, the system of working has been changed, and is now being worked under simple coppice method with a rotation of 15 years. We had the opportunity of learning how quickly Eucalyptus grows, and the stately reserves left along the margins of road and elsewhere were measured for this purpose. During a period of 48 years they have grown to a height of 200 feet and a girth of 12 feet.

We were shown in the areas that were felled a few years back the two kinds of shoots which a stool gives out viz, coppice, & pollard; coppice shoots come out from the neck of the shoots from dormant bud, and the pollards from between the bark and the wood on the cut surface of the stump. To find out as to which of these come vigorously we took measurements in a coupe felled 2½ years ago and in another coupe felled 6 months ago. The difference arrived at between them though small, would by no means be negligible taking the very small period of growth into consideration. The coppice shoots are therefore better than pollard shoots.

officer in charge of Senior Division camp who spared no pains to bring home to the minds of students and servants the result of an insanitary camp The students feel thankful to the authorities concerned for having so kindly arranged for supply of milk. The camp was often visited by our Principal who on all occasions had congratulated the students on their genuine efforts to improve the beauty of camp site, at the same time admonishing those who made no move in that direction. Finally when the Chief-Consr. the Honb'le Mr. S. Cox accompanied by Mrs. Cox came to inspect, all the tents had their little gardens to boast of.

As a precaution against fire in camp all the students had practice in fire drill and the servants also were taught how they should behave in the event of an outbreak of fire in camp.

It will not I think, be out of place to mention here that the Madras Government students who went to camp as Deputy Rangers have had to hear that they were all elevated to the rank of Probationary Rangers with effect from October 1919. Their joy knew no bounds when this was announced by Mr. C. C. Wilson and all the students immediately sent a telegram to the Principal thanking him for his efforts to win them that which they were longing for. This bit of glad news kept up the sprits of students in the midst of hard outdoor work. Their greatful thanks are due to the Principal, to the Chief Conservator and to H. E. the Governor, who now has the Forest Portfolio

The students' camp came to a close on the 19th May and on the 20th was seen a string of cycles running down the hills to Mettupalayam.

T. M. Doraisamy Pillai
Assistant Editor.

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The Junior Division Camp, Ootacamund.

The students of 1919-1921 division, camped at Ooty from 6-4-20 to 18-5-20 and the camp broke on 19-5-20. During the last year this camp extended for one month and this year for a longer period.

The camp was fixed in the same site as last year i. e. in the Arambly Reserved forest in a cleared area surrounded by *Frenela Rhomboidea* plantation, commanding a nice scenery of the ridges overlooking the plains of Segur, Kargudi and Mysore. The College made arrangements for the supply of drinking water in camp from an adjoining tap, through coolies.

Our work in Camp. During our stay in Ooty we constructed a portion of a fuel shoot for shooting down the fuel from steep places in Snowdon Reserve. Hitherto the practice is to engage coolies to bring down the fuel. Now in its place the shoot (slide) was constructed which is hoped to work successfully. Two days were spent in verifying a portion of the boundary line of the Arambi Reserve. This camp gave everyone of us a very good practice in the practical use of the various survey instruments, such as Levels (Dumpy and Abney's) Ghat-tracer, Plane table and prismatic compass. We surveyed a portion of the Arambi Reserve for the ensuing plate, aligned a road to the instructor's camp from an existing road (Havelock's) and took levels for the aligned road. We did contouring for the first time here.

We visited the various working circle of this Range viz Cairn Hill, Snowdon and Arambi coppice working circles and Muthinad High Forest working circle. We remeasured and calculated the Volumes of standing crops in two sample plots of *Frenela Rhomboidea* in Cairn hill and Arambi respectively to compare their growth and increment in

volume since 1912 when they were measured. Of the 2 sample plots the one in Arambi was thinned in 1912 and the other not. In both plots the crop is putting fairly satisfactory increment but the thinned plot shows more improvement in girth and volume. We marked trees for thinning in both the plots, felled, billetted and stacked them. Here the custom of felling trees is by sawing them whereas in other places they are felled by axes alone. The sawing saves time. Here the principles of thinning a crop of Conifers were discussed and practically pointed out. That is, Conifers and especially *Frenela Rhomboidea* even when grown in a close crop do not clear their side branches soon. But the side branches do die after some time; even then they take a long time to detach themselves from the bole of the tree. Hence heavy thinning would encourage the development of the side branches which results in knots in the timber. So, light thinnings alone should be done and that as often as possible. In teak a heavy thinning would result in the appearance of epicormic branches developed from the dormant buds on the stem. In Eucalyptus, even when heavily thinned there is no fear of the appearance of the epicormic branches but since they are shallow rooted in places exposed to wind care should be taken to reserve a sufficient wind belt or heavy thinning should be commenced from very early stage so that they may establish themselves more firmly, or light thinnings alone could be resorted to when systamatic thinnings were not done in their early stage. These are the new principles of thinning, learnt in this Camp.

We remeasured some of the standards reserved as such in Cairn hill from 1885 which were measured in past years.

In Arambi we saw the coppice felling series of *Eucalyptus Globulus* and the natural Forests, the Virgin Shola occupying a portion of the said Reserve.

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In Muthinad high Forest working circle we saw two sample plots side by side one thinned and the other not. This plantation is 72 acres in extent and being remote from any of the market was not cared for and allowed to grow as high Forest. Till 40 years of age the plantation was not thinned properly. At present the plantation is only being thinned slowly little by little at about 7 acres per year as per a special working plan introduced in 1915 by Mr. J. H. Longrigg the present Officer in charge of Junior Division when he was serving in the Nilgris District. This year we marked a portion of coupe No. 6 for thinning due for thinning this year. Owing to scarcity of labour, trees marked in previous years for thinning are not yet felled. The trees which we marked were felled in our presence to see no damage is done to crop to be left standing. Thus we had the opportunity of witnessing felling of huge bluegum trees in this plantation. Here we saw an octagonal permanent pucca brick-built kiln and many pit kilns used for the preparation of charcoal.

In Brooklands very near the thinned plantation we girdled a very huge Eucalyptus Globulus tree for being felled in 1923 and sent to the Engineering College for mechanical test to find the value of Bluegum timber. We saw another huge tree girdled by the present senior students last year and the tree is completely dead and leafless

We saw the experimental plantations of 9 species of Eucalyptus planted in three different altitudes viz Keti 6700; Arambi 7300 and Snowdon 8300; It is too early to draw up any definite conclusion from the said plantations. We had been to the top of the Dodabetta peak 8432' the highest on the Nilgiris plateau and from there we went to Tiger-hill reservoir intended to supply water to the Government house and its vicinity. We were shown how the catchment area is protected from grazing by fencing all around (an expensive one) and from any

fellings in the sholas which are regulators of water supply throught the year. Inspected the Range office and forest depot at Ooty and learnt the manner of keeping timber and other accounts and checking of the depots. We had been to the Government Botanical gardens and studied botany of the various species. Here we saw the various kinds of forest products prepared from the trees grown in the garden itself. We also measured the heights with Aboney's level of 3 very tall Blue gum trees in the garden. The height of the tallest of the 3 trees measured was found to be 195.'

During our camp at Ooty Mr. H. Tireman, the late Conservator of Forests Western Circle who always took a keen interest in the welfare of the College, the Honourable Mr. S. Cox the Chief Conservator of forests accompanied by Mrs. Cox visited our camp. Mr. Kirwan, the future Principal of the proposed Dharwar Forest College of the Bombay Government accompanied by our Principal inspected our work in the field and visited the camp. His Excellency the Governor of Madras visited our camp on the 4th May and kindly made enquiries about every student. Our Principal as usual inspected many a time our work in the field, visited the camp very often and made enquiries into the requirements of the students with a paternal love. Mrs. Cowley-Brown has also visited the camp and made very kind enquiries of the students' health.

The camp being the best sanitarium, all the students greatly enjoyed the camp and with the exception of a few cases of Malarial fever there were not many on the sick list.

T. PALANIKUMARU.
Junior Student.

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The opening of a Night School for the servants of the Village Council, in the Madras Forest College.

There are 40 servants' quarters for the accommodation of College peons, watchers, tent lascars, hostel watchers, sweepers, malis and private servants. These are fully occupied and applications for more rooms are being refused for want of accommodation.

Many of these servants are illiterate and are ignorant of Elementary hygiene; sanitation in the College Estate is a subject to which very great attention is paid. The servants (many of them) cannot rise to the occasion for want of education. They were fond of spending their leisure time in a toddy shop close by (lately opened without the consent or knowledge of the Forest College) with the inevitable consequences of petty thefts, silly quarrels &c.

To elevate them from the depressed condition and to make them useful citizens, a night school was opened in the Estate from 10-11-1919.

The hours of the school are 18-30 hours to 20-30 hours. Adults and children are admitted. For the servants and servants' children education is free. The School was started in one of the rooms of the servants' line 12'×10'. The number of school-going students (adults and children) rose to 29 in the middle of January 1920. It was then found that the room 12'×10' could not accommodate 29 students and the master. The School was then shifted to an open pandal constructed by the school-going men near the north lines.

The School was started in a humble way with the Office attender as its master. It is becoming a very useful institution for the education of the servants' children and of the adult servants. It has improved

the tone of the life of the servants on the College Estate, and is now worthy of Government encouragement and a special building.

K. Ramasawmi Iyer.

Madras Forest College. *Vs.* Agricultural College.

(Drawn)

This, the first match of the Season was played on our ground on March 18th. At the start the Forest College pressed, and the Forwards had several chances but failed to score. The Foresters were playing a more open game than their opponents. Narayanaswami was prominent at outside right. It quickly became clear however that the Agricultural men were quicker on the ball. The Forest inside Forwards and halves were slow on the ball for the most part. Although the visitors were neat and quick however, they clung to the ball too long and finished weakly in front of the goal The Forest backs were very safe, Captain Juriansz tackled strongly and Ramalingam kicked accurately The latter made a most promising first appearance. In the Second half the Forest College had sun and wind in their favour and in the closing stages the inside Forwards began to find their game and nearly scored. The game ended in a pointless draw.

Teams :—

Agricultural College.

Yeggnaswami.

(Goal).

K. S. Bhandari. Periya Shastri.

(Backs).

Baghiratha Padki. Narayana Menon. Anthony.

(Half Backs).

G. K. S. Menon. Krishnaswami. Siva Rajan. Annaswami. Doraiswami.

(Forwards)

Madras Forest College.

J. D. Theodore. M. P. Subbayya. Mr. J. H. Longrigg.
Mr. R. B. Cornwell. V. Narayanaswami.

(Forwards)

K. Thangavelu. Mr C. C. Wilson. N. S. Eswaran.

(Half Backs)

L. E. Juriansz. S. Ramalingam.

(Backs).

Abdul Rahim Khan.

(Goal).

Madras Forest College. *Vs.* Agricultural College.

This return Match was played on the Forest ground on March 23. Eswaran was dropped from the house side, J. D. Muthiah, a Ceylon student, coming in at left half, while M. P. Subbayya, replaced by Rahim Khan at inside left, reverted to the post of Goal keeper. These changes strengthened the side. The Forest College kept up a steady pressure almost throughout the game and on the run of the play it would have occasioned no surpirse if they had won handsomely.

The Forwards still short of practice were troubled in shooting by the odd shape of the ball but were not quick in making an opening for a shot at Goal, being carefully shadowed by the Agricultural College Backs. This was the more tantalizing as they showed very fair combination and took the ball rapidly down the field in a number of pretty passing movements. It may be expected that the Forwards will settle down and learn to score goals at an early date, given a spherical ball. The Forest Halves played a bustling game and never allowed their opponents to settle down but were not very successful in giving accurate passes to their Forwards, while both Juriansz and Ramalingam played well at full back. For the Agricultural College the Forwards

showed insufficient cohesion as a line, and were apt to keep the ball in the air. Their two backs played a vigorous game and are to be congratulated in keeping their goal in tact.

Teams.

FOREST COLLEGE ;—M. P. Subbaya (Goal).
L. E. Juriansz and S. Ramalingam (Backs).
K. Thangavelu, Mr. C. C. Wilson and J. D. Muthiah (Half Back).
V. Narayanasawmi, Mr. R. B. Cornwell Mr. J. H. Longrigg.
Abdul Rahim Khan and J. D. Theodre (Forwards).

AGRICULTURAL COLLEGE :—Yegnasami (Goal).
K S. Bhandari and Peryashastri (Backs).
Antony, Narayana Menon and Annasawmi. (Halves).
Seetharam Raju, Dhana Raj, Shiva Rajan, Krishnaswami and Krishnamurthi. (Forwards).

* * *

Visit of the President of the French Republic to the Nancy Forest School.

(*From the Revue des Eaux et Forêts.*)

On Sunday, June 8th, 1919, the President of the French Republic paid the National Forest School the high compliment of a ceremonial visit. In honour of the reception a large tent draped with tricolours and adorned with hunting horns had been erected on the turf

in front of the Nanquette pavilion, while around the monument erected to the heroes of the 1870-71 war were draped groups of flags and banners.

To emphasize the importance attached by the Forest Service as a whole to the action of the President, a distinguished gathering of past and present Conservators and other high Officers assembled with the staff and students of the School to celebrate the reception. The President of the Republic accompanied by a brilliant staff arrived at 11 hrs. 20 min. and were received at the School entrance by the Director, and Professors. To the sound of the hunting horn Monsieur Poincaré and his State Officials where then conducted to the Nanquette Pavilion where the Director of the School voiced in felicitous terms the School's appreciation of the honour paid to it and to the whole Forest service by the President's gracious action. In his reply the President expressed his pleasure and satisfaction in having been able to visit the School, and dwelt at some length on the services rendered by past and present members in the successful overthrow of their national enemy. He also emphasized the gravity and scope of the task that confronted the whole Forest Corps in remedying during the course of future years the Sylvicultural ravages and depredations committed by the barbaric foe.

The President then entered the various halls and lecture rooms of the School, and displayed throughout his visit a warm interest in and sympathy with the aims of the school and of the Service.

Occasional Notes.

His Excellency the Governor will preside at the Prize day on June 29th.

The Principal acknowledges with thanks the receipt of "The Englishwoman" presented by student Murjani for the Students' Library.

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We have received through the kindness of the Conservator of Forests, Western Circle, an old Forest Bangalow book of North Malabar. Ancient records of this type will always be a welcome addition to the College Library.

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The Principal, Madras Forest College, acknowledges with many thanks the receipt, of Rs. 100 from Mr. T. D. Poonjah, Mr. Hons, Rs. 80 from Mr. S. Chinnadorai, Range officer, Balapalle, and Rs. 20 from Student A. Rama Rao towards the building of the Students' Club.

* * *

The Principal would be glad to receive a Hay Press for the use of the College.

Miscellanea.

The non-mineral elements in wood substance are about the same in all woods being in the proportions :

Corbon.....49% (by wt.)
Oxygen ... 6% „
Hydrogen 44% „
Ash etc ... 1% „

The ash content may vary from 0·3% to over 3%.

* * *

Green wood contains water in two forms, *viz*, as *free water* (as in the lumina of the trachae and tracheids) and as *hygroscopic* moisture intimately absorbed by the substance of the cell walls.

The limit of the hygroscopic moisture varies from 20-30% of the dry weight of the wood. In rare cases it appears to be as high as 90 % as in *Eucalyptus globulus*.

* * *

In the living tree the amount of moisture in the wood may range from 250% of its dry weight to about 30%. Heartwood of conifers contains about 30%, but the sapwood 100—150%.

———Extracts from "The kiln drying of lumber" by H. D. Tiemann.

* * *

(*From the Révue des Eaux et Forêts.*)

"The Forester, besides being the Executive Officer, of undoubted capacity, for the Government and communal landed property entrusted to him, should also be for the public, the adviser and educator in Forest matters: above all for that special public consisting of Proprietors and Managers of Woods and Waters, should he be the skilled counsellor in all that concerns his science and profession.

In fact he must in no small degree be the Professor of Sylviculture and Pisciculture side by side with the professor of Agriculture, and in constant relation with the latter, each helping and forming the complement of the other."

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Reviews.

The following have been received from Messrs. Chapman and Hall :—

i. "Forest Products.—Their manufacture and use."
By N. C. Brown, B. A. M. F.

ii. "Forest Management"
By A. B Recknagel B. A. M. F. and J. Bentley B S. M. F.

iii. "The Theory and Practice of Working Plans."
By A. B. Recknagel B. A. M F.

"Forest Products." The volume may be described as a brief but fairly exhaustive guide to the study of the utilization of what are termed in India "Minor Forest Products" but it also includes chapters on Sleepers Cooparage &c.

The author states that his work is merely a preliminary to a group of more exhaustive volumes.

Although primarily intended for American readers there is in the present book much that is of benefit and interest to Indian Forest Officers.

The chapter on wood pulp industries will be of special value to a Forester seeking to develop the demand to what were formerly termed "useless species". Tanning materials, including Mangrove, Divi Divi and Wattle, are fully dealt with. Apparently America imports Mangrove and Divi Divi bark from foreign countries but not from India. Herein lies a strong plea for a Trade Commissioner for every Province.

Other chapters are devoted to Veneers, the turpentine industry in all its ramifications, wood distillation, and a specially instructive article on charcoal manufacture.

The above are merely among some of the subjects that are of interest to our Service—the volume contains also several chapters on matters of less direct importance to Foresters in this country.

The necessity for the Science of Forestry in America is demonstrated by the significant statment "We are using our Forests three times as fast as they grow".

The print and paper are excellent—the illustrations clean, artistic and helpful. We look forward to a more ambitious volume from the same pen.

"Forest Management." The scope of this work covers considerably more than the field of formal Working Plans. The actual preparation of the latter (termed Forest organization) is confined to a third of the volume—an equal space being allotted to Forest Mensuration preceded by a useful preliminary chapter on Survey (in which amongst other practical hints the danger of erroneous readings from the compass being set up near a wire fence is alluded to).

Indian Forest Officers will regret that a detailed description and illustration of the Biltmore height-measuring stick have not been given.

The final chapter "Forest Administration" contains some significant remarks that will have a familiar–or at least an appropriate–ring to Madras Officers: "Direction-This may be handled in one or two ways. Either *Bureocratically* by means of a Director or *Collegially* by means of a Majority vote of the Committee or Commission directing the work. The former is of advantage where quick decisions are to be reached and matters pushed vigorously."

C. C. Wilson, Esq., Deputy Conservator of Forests, has joined the staff of the College, *vice* Saiyid Abdul Qadir Sahib Bahadur. Mr. Wilson was a 'Blue' at Oxford. During the war, he served with the 12th Cavalry in Mesapotamia.

* * *

On the recommendation of the Vice-President, S. Ramalingam is awarded his colours for Football and is appointed Vice-captain.

* * *

Student Palanikumaran will be Assistant Editor for 1920—21.

* * *

Certain types of axes, knives, kukris &c., have been standardised for use at the College and are being manufactured by a Sheffield Firm.

Each student will in future purchase one axe and one knife on joining the College to be used while on Field duty.

* * *

On May 4th His Excellency Lord Willingdon accompanied by an A. D. C. visited the Junior Division Camp at Arambi. Each student stood at attention outside his tent. His Excellency, accompanied by the Principal, the Officer-in-Charge of the Camp (Mr. Longrigg), and Mr. Abdul Karim, made a minute inspection of the tents and kitchens, and spoke to nearly every student. The practical work e. g. brick-making, road alignment, and thinning, particularly attracted His Excellency's attention.

The direct and personal interest evinced by Lord Willingdon in the students will certainly prove a stimulus to all connected with the College to uphold its traditions of the past.

* * *

The Chief Conservator of Forests visited the Junior Division Camp at Arambi in April and the Senior Division Camp at Bandyshola in May.

* * *

On May 12th the Surgeon General paid an informal visit to the Junior Division at Arambi Camp.

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The Library has been enriched by the addition of a complete set of Raemaeker's cartoons, and three numbers of Bairnsfather's sketches of the British Soldier.

* * *

"Forty-four months in Germany and Turkey" by Har Dyal has been added to the Library. We commend this little book to the notice of students. The author was a red hot leader of the Extremists until he went to Germany and Turkey. Before he left those countries he changed his opinions very materially.

* * *

The receipt of one copy each of the "Indian Forester" July 1908 and August 1910, from Mr. Jogeeswara Rao Range Officer, Rachakonda, East Kurnool is acknowledged with many thanks.

* * *

His regard for the College was evinced by the keen interest he took in the development of the Museum; at all times when his expert advice was required on matters concerning Botany and timber, the fruits of his experience were offered ungrudgingly. His death is a loss to the College, and the College therefore ventures to tender its respectful sympathy to his bereaved widow and children.

Edwin Arnold has told us that "Every Forest Officer is a Priest of the true religion," and of that faith there was never a more fervent exponent than ALFRED LUSHINGTON.

List of books added to the Libraries up to 31—3—20.

General Library.

1.	Baxter swimming instructions	1 Copy.
2.	Report on Forest Administration in Burma for the year ended 30th January 18	1 „
3.	Proceedings of Government of Bombay (June 1919) ...	1 „
4.	Administration Report of the Forest Department of the Madras Presidency for 12 months ending 30-6-19	2 „
5.	Jonrnal of Indian Botany Volume I Nos. 2 to 7 by P. F. Fyson, B. A.	10 „
6.	Indian Forest Records Vol. VII part VI regarding "Sal" by R. S. Perason I. F. S.	1 „
7.	Working Plan for the Shahdera-cumjhughiam plantation for the year 1916—17 to 1930-31 ...	1 „

8.	Report on Public Instruction in the Madras Presidency for the year 1918—19 (Vol. 1 and 2) ...	2 Copy.
9,	Lumbering and wood working industries in the United States and Canada etc. by F. A. Leete. ...	9 „
10.	Manual of Malabar District by W. Logan ...	1 „
11.	Proceedings of Government of Bombay for July 1919 ...	1 „
12	Agricultural journal of India Vol XV. part I.	1 „
13.	Indian Forest Records Vol. VII. part VII. The life history of the Toonshoot and fruit borer etc. by C. F. C Beeson, M. A. I. F. C.	1 „
14.	Memorandum on the Conolly Teak Plantation at Nelambur, Malabar District by Atholl-Macgregor M. c. s.	1 „
15.	Proceedings of the 9th Conference of the Conservators of Forests in Burma held at Mayango from 9th to 17th June 1919.	1 „
16.	Working Plan for the North Zamayi Reserve in the Pegu Forest Division Lower Burma. by A. H. M. Barrington Esq	1 „
17.	The common Fodder grasses of the Madras Presidency ...	1 „
18.	Proceedings in 1919 with regard to the preparation of Working Plans in Burma	1 „
19.	Progress report of Forest administration in Beluchistan for 1918—19.	1 „
20.	Interim Working scheme for the Yoma Reserves in the Zigon Forest Division by H. W. A. Watson Esq.	1 „
21.	Proceedings of Government of Bombay August 1919 ...	1 „
22.	Proceedings of the Board of Forestry at meetings held at Dehra Dun between the 31st March and 8th April 1919.	1 „

"Centralisation-e-g., all handled from Washington with long distance correspondence. The Inspectors have no authority to correct things on the ground : they merely report *usually at great length.*"

"It is poor policy to have a high priced official doing work which a cheaper subordinate is equally capable of performing."

"The Forest Officer should before too advanced an age attain the right of retirement on an adequate pension."

"It is necessary that they be furnished with proper dwellings.

In the Appendices will be found a large number of useful tables.

To acquire a theoretical knowledge of Working Plans the information available in this Volume is hardly sufficient but for obtaining a general purview of the subject the work has much to recommend it.

The preface contains the following admirable dictum :—

"Forestry as a business must conform to the Principles which make for success in any other business." At the Dehra Dun 1919 Conference it was remarked "Actions in restraint of trade are actionable at Law. !"

"*Working Plans.*" This volume forms the complement of the last and fills the lacunæ in the subject proper of Working Plans.

The book is clear, concise and yet fairly exhaustive. Indian Forest Officers would like the French Quartier Bleu system (perhaps the ideal method for the more advanced of our High Forests) to have been dealt with in detail and also the inclusion of a model Working Plan Report.

The sections on conversion of a transition Forest and on Volume by Diameter classes - the "Indian method" are of special interest.

The final chapter on the difficulties of Forest organization in America will appeal to all Madras Forest Officers.

The few diagrams in the book are excellent: some of the pictures are of interest rather than of direct utility.

Obituary.

By the death of A. W. Lushington on March 25th the Madras Forest Department has lost its finest Forest Botanist since the days of Gamble, and the Service generally an ardent enthusiast. In these days of change and uncertainty, when the Senior Officers are prone to misgivings as to future developments, the happy optimism of Alfred Lushington was rather like Dr. Johnson's definition of 2nd Marriage "a triumph of Faith over experience" and at that an admirable antidote to prevailing discouragements. "A. W. L." as he was known to his large circle of friends was a victim to unflagging devotion to duty- for a few months ago he was prostrated in Orissa by a severe attack of Black Water Fever, but this did not deter him from an arduous tour of Special duty in the vicinity of the Western Ghats. Shortly after his returning to Waltair to resume regular work in the Department, he was taken ill and now the Department is the poorer for the loss of a gallant hearted Officer.

Educated at Malvern, professionally trained at Nancy, and imbued with all the love of the Forests with which that

great French School habitually inspired its alumni. Lushington entered the Forest Service in 1882 and was posted to Madras. His ancestors had held high office in the Hon'ble East India Company's Service in Madras and Bombay—one of his forbears having been Governor of Madras 1827—32. Ganjam, Kistna and Kurnool were the early scenes of his activity. At that period the life of a District Forest Officer in the matter of communications, lodging, transport, and general bundobust was very different from the easy present day circumstances. Lushington certainly never regarded it as an intolerable hardship to spend over two months away from Head Quarters. Those were the days of pioneer conditions and men were made thereby. In the eighties the work was mainly selection, demarcation and settlement. The upper Controlling Staff consisted almost entirely of European Officers—sufficient in numbers for the needs of the day. The Rangers were mostly untrained but many of them very useful men. Working Plans were practically non-existent and Protection (Fire and General) was not very effective. But the comparatively light correspondence gave facilities for exploration of which Lushington availed himself to the full. Always a lover of nature and devoted to an outdoor life he early in his career specialised in Forest Botany, and the value of his work in this direction was warmly recognised at Kew. His magnum opus was the monumental "Vernacular list of Trees, shrubs and woody climbers in the Madras Presidency" and his reward was the authority that his opinions carried in questions of identification not less than the C I. E. conferred on him in 1915. The compilation of this important work occupied five or six years,

and involved his rising usually long before dawn to avoid encroachment on regulation office hours. For he was always busy and always a prolific writer In his capacity for taking pains he had no equal in the Department and his mind was a rich storehouse of carefully collected facts. As a remedy against the hasty botanical impressions or conclusions of youths more experienced in the Examination Hall than in the Field his was a valuable corrective influence. His "Madras Timbers" 1919 also contains much information valuable to a Forest Officer.

Shortly before his death he had completed a Leaf-key for Trees; its publication by Government would doubtless be of advantage to the Department

From 1903 till his retirement in 1915 Lushington was Conservator of Forests, Northern Circle, and in this sphere also Botany was perhaps always his first love. Nevertheless in spite of discouragements and adverse criticisms he never spared himself in matters of general administration. As a walker few of any age could live with him. A warm friend quick to appreciate sympathy and perhaps not less slow to protest against ignorant prejudice or criticism, he retained the affection of all worthy opponents.

A year or two after his retirement his abilities were again requisitioned in a temporary capacity, but the conditions of work proving uncongenial he severed his connection with the Service only to be re-employed not long after the Chief Conservator had taken over charge of the Department.

23. Working Plan for the Yoma Reserves in the Tharrawaddy Division Vols. 1 and 2 ... ... 2 Copy.
24. Forty Four months in Germany and Turkey by Har. Dyal. ... ... 1 „
25. Report of the Nilambur Teak Plantations by Col. Beddome. ... ... 1 „

Students' Library.

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1. Confessions of a country Curate ... 1 Copy.
2. The art of reading in Public by G. F. Cowley-Brown, M. A. ... 1 „
3. H. M. S. Anonymous by Taffrail ... 1 „
4. "U" boat 202. The war diary of a German sub-marine by Captain Barry Donavile. ... ... 1 „ } By purchase.
5. Indian Forester (July 1908 and August 1910) ... ... 2 „
6. The English woman ... ... 1 „ presented by student Murjani.
7. War maps ... ... 47 Presented by Mrs. Cowley-Brown.
8. Raemaker's Cartoons (26 parts) ... in 2 vols. } by purchase.
9. British army in France (3 parts) ... „ 1 vol. }

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List of contributions to the Museum.

Serial No.	Contribution.	Contributor.
1	Specimen of *Quercus suber*	G. Oakes Esq. Nilgiris.
2	Specimen of a gall on *Anogeissus latifolia*	K. G. Monappa; Student M. F. C 1918—20 Dn.
3	1 long panel and 4 short panels	M. R. Ry. E. K Krishnan Avl. D. F. O. North Vellore
4	One scale made of *Hemicyclea sepiaria*	Do
5	Specimen of a moth	M. B. Subbayya; Student M. F. C. 1918–20 Dn.
6	Feathers of The Indian Roller	Mr. K. C. Joseph, Range Officer, Puttur.
7	2 long panels	J. S. Scot Esq. D. F. O. South Coimbatore.
	4 short panels, and,	
	4 blocks.	

Advertisements.

The following is a list ot timber species required for the Gass Museum. Such of them as are procurable may be sent to the Principal *together with botanical specimens pertaining to each species and a sample of bark about 8″ square.*

The long panels should be as broad as available, 6 ft. long and 3″ thick. The short panels 2 ft. long and 1″ thick (breadth, maximum available).

Aglaia Roxburghiana.	Erythroxylon monogynum
Aquilaria Agallocha	Gmelina arborea
Adina cordifolia	Gluta travancorica
Artocarpus integrifolia	Grewia asiatica
Albizzia procera	Hardwickia pinnata
Albizzia stipulata	Hardwickia binata
Acacia dealbata	Holoptelea integrifolia
Acrocarpus fraxinifolius	Hydnocarpus Wightiana
Berrya ammonilla	Hereteria papilio
Chickrassia tabularis	Litsaea zeylanica
Carallia integerrima	Machilus macrantha
Dillenia indica	Premna tomentosa
Dillenia pentagyna	Sterculia fœtida
Dysoxylon malabaricum	Sterculia villosa
Diospyros tomentosa	Sterculia guttata
Diospyros paniculata	Stereospermum chelonoides
Diospyros ebenum	Stephegyne parvifolia
Delbergia sissoo	Tetrameles nudiflora

The following numbers of the 'Indian Forester' are required for the *Student's* Library, The Principal will be glad to receive any that officers can spare :—

1. Volume 1, 2 and 3 for 1875—76, 1876—77; and 1877—78.
2. Volume 6 for 1880—81.
3. Volume 14 for 1888—January, February, March, April, September, October, and December numbers.
4. Volume 15, 16, for 1889 and 1890.
5. Volume 18 for 1892 August, September, October, November.
6. Volume 19 for 1893 February number.
7. Volume 20 for 1894—July and August number.
8. Volume 21 for 1895.
9. Volume 24 for 1898—March and April numbers.
10. Volume 25 for 1899—April, May, June and August, September, October, and December numbers.
11. Volume 26 for 1900—August number.
12. Volume 39 for the year 1913—January, April, September and October Nos.
13. Volume 44 for the year 1918—March number.

WANTED.

A copy in good condition of "Hume and Marshall's Duck" with coloured plates intact. Apply stating price to the :—

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Rs. 2—4—0 will be paid for it.

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Wanted to purchase.

Eight copies Gamble's "Manual of Indian Timbers". Apply stating Edition, Price, Condition to :—

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The Principal will be glad to receive trophies for the Game Museum, either as a permanent gift, or, on loan for not less than 18 months; also any old records, maps, etc, of historical interest to the Department, for the College Library.

Gazette Notifications.

MARCH 2ND 1920.

M. R. Ry. V. Narayana Ayyar, Avl. E. A. C. *sub-pro-tem.*, working under the D. F. O. Ganjam, to act as D. F. O. West Vellore Division.

M. R. Ry. L. S. Krishnan, Avl. Probationary E.A.C. of Forests, S. Malabar posted to Central Coimbatore division for duty under the D. F. O; to be relieved immediately.

M. R. Ry. P. Govinda Menon, Probationary E. A. C. of Forests, Mudumalai Range, is, on relief, posted to Nilambur, for duty under the D F. O.

This cancels the posting of M. R. Ry. P. Govinda Menon to Central Coimbatore for special duty.

MARCH 9TH 1920.

Mr. L. S. Janes, D. F. O., Bellary privilege leave for 4 months from 7-4-20.

Mr. A B. Myers, D F. O., Anantapur, to be in charge of Bellary in addition to his own duties.

Md. Abdul Hafiz Sahib Bahadur, D. F. O., Upper Godaveri granted privilege leave for 25 days from 7-4-20.

The D. F. O., Lower Godaveri will be in charge of the U. Godaveri Dn. in addition to his own duties.

Mr. A. Nicholas, Ranger IV grade, S. Coimbatore Dn. granted combined leave from 2—12—19 to 10—4—20.

MARCH 16TH 1920.

Mr. A. B. Jackson, acting Conservator of Forests, privilege leave for six months and furlough on average salary for two months in continuation thereof in lieu of the combined privilege leave and furlough for 9 months already granted to him.

Mr. H. A. Latham, Conservator of Forests, privilege leave for 5 months and 9 days, and furlough on average salary for 3 months and 17 days in continuation thereof in lieu of the combined privilege leave and furlough for 8 months and 15 days already granted to him.

MARCH 23RD 1920.

Mr. G. S. Lasrado, D. F. O. North Malabar, privilege leave for 4 months with effect from the date of relief.

M. R. Ry. L. R. Narayana Ayyar, Ranger III grade, on spike duty, N. Salem Dn. granted privil ge leave on medical certificate for 2 months, with effect from date of relief:

M. R. Ry. P. A. Krishnasamy Mudaliar, Ranger V grade, on special duty, in Madura dt. posted to Spike duty, in N. Salem, *vice* M. R. Ry. L. R. Narayana Ayyar, Ranger III grade granted leave.

M. R. Ry. A. K Kandan, Ranger V grade in charge of Cauvery range appointed as Senior instructor, V. T. S. *vice* M. R. Ry. C. M. Belliappa who is reported to be sick.

M. R. Ry., G. N. Subba Rao, Ranger VI grade is on return from leave transferred from South Salem to N. Salem division for charge of Cauvery range

Mr. L. J. Taylor, Ranger III grade S. Vellore Dn permitted to affix the Easter holidays to the privilege leave granted to him.

P. B. Syed Yahia Sahib, Ranger VI grade S. Vellore Dn. granted privilege leave for 4 months from 8—4—20 and on relief by Mr L. J. Taylor

MARCH 30TH 1920.

M. R. Ry., K. Gajaraja Mudaliar Avergal, E. A. C. on return from leave to be D. F. O. Vizagapatam.

Saiyid-ud-din Ahmad Sahib Bahadur, to be permanent E. A. C. with effect from 17th September 1917.

M. R. Ry., V. N. Seshagiri Rao Avl., Confirmed as E. A. C. with effect from 19—2—18.

Mr. D. L. Sathe, D. F. O. Guntur, granted privilege leave for 1 month from 3—5—1920.

M. R. Ry., V. N. Seshagiri Raao Avl., to act as D. F. O. Guntur during Mr. Sathe's absence on leave.

Captain W. G. Dyson, M. C. Asst. Consr. of Forests attached to the Cons's. office, W. Circle, transferred to the Nilgiri Dn. for Coonoor Range.

M. R. Ry. C. Sankunni, Ranger II grade, in charge of Coonoor range is, on relief, to remain attached to the same range until further orders.

APRIL 6TH 1920.

Mr. H. C. Bennett, Dy. Conservator of Forests, now doing duty as Chief Forest Officer, Coorg, on reversion to this Presidency, *to act* as Conservator of Forests, Central Circle, Madras, during the absence of Mr. A. R. Jackson on leave or until further orders.

Mr. C. E. C. Fischer, Dy. Conservator of Forests to act as Conservator of Forests. and to be in charge of Western circle with effect from the date of taking charge, *vice* Mr. H. Tireman, granted leave, or until further orders.

(1) Mr. T. I. Chakko, Ranger IV grade on return from leave, posted to Tunacadavu Range, S. Coimbatore.

(2) Mr. A Nicholas, Ranger IV grade posted, to Kasargod range, S. Mangalore.

(3) Mr. K. C. Joseph, Ranger V grade posted to Shankaranarayana range.

APRIL 13TH 1920.

M. R. Ry. T. Balaramasamy Naidu, from Parlakimedi Maliahs to Vizagapatam to work as Reserve Ranger.

M. R. Ry. N. Chakrapani Ayyangar Ranger VII grade, from Vizagapatam to Parlakimedi Maliahs.

(1) M. R. Ry. B. Bhagirathi to Ganjam Dt. for Pondakholo range.

(2) Mr. W. S. Fernandez to Vizagapatam for Palakonda Range.

M. R. Ry. G. Devanayagam Naidu West Vellore Dn, granted privilege leave from 23—12—19 to 18—4—20.

APRIL 20TH 1920.

The combined privilege leave and furlough for two years already granted to Mr. C. D. McCarthy, Conservater of Forests will be commuted into : (1) privilege leave for 3 months and 17 days (2) furlough on average salary for 4 months and 13 days and (3) furlough on half average salary for 11 months and 17 days.

Mr. J. A. Master, D. F. O., S Cuddapah division granted privilege leave for 1 month from 1st May 1920.

M. R. Ry. A. Hanumantha Rao Avl. D.F.O. W. Cuddapah Division will act as D.F.O. S Cuddapah Dn., in addition to his own duties during Mr. Master's absence on leave.

M. R. Ry. A. Baviah, Ranger VI grade, on return from leave, posted to Kalyandrug range, Anantapur Dt.

M. R Ry. N. C. Mahadevan Ranger VI grade on special duty, Guntur Dt. granted privilege leave for 2 months with effect from date of relief

APRIL 27TH 1920

Mr. H. F. A. Wood, Conservator of Forests III grade granted extension of furlough for four months.

M.R.Ry. D. C. Bhide to Chendragiri range. M.R.Ry. P. K. Kuttappan Pillai, to work under D.F.O. South Cuddapah.

M.R.Ry. B. V. Vaideswara Ayyar to Kavali range, Nellore Dt.

M.R.Ry. C. BalayyaNaidu to work under D F.O. Chingleput, in connection with the clearing of undergrowth in Guindy Park.

(1) M.R.Ry. B. Gulab Singh (Asst. Ranger, Mudumalai) granted privilege leave for 3 months with effect from 15—5—20.

(2) P. Krishnan, Forester I grade S. Malabar transferred to Nilgiris and promoted as Ranger VII grade *vice* No. (1)

Mr. K. C Joseph to Jalsur Range to work under the orders of the Sylviculturist.

Mr. S. F. Lobo posted to Shankaranarayana Range.

MAY 4TH 1920.

Mr. H. Tireman granted as much privilege leave as may be due to him the date of relief, and furlough on average salary for 3 months in continuation thereof, in lieu of the combined privilege leave and furlough for 7 months and 11 days.

Mr. C. C. Wilson granted extension of furlough by 13 days, and the whole period of furlough thus granted to him will be commuted into furlough on average salary.

Promotions :—With effect from 1st April 1920 :—

(a) To the first grade (permanent)—

Mr. K. P. Krishna Ayyar, Ranger, second grade.
Mr. T. Subbarayalu Nayudu, Ranger, second grade.
Mr. J. A. Aranha, Ranger second grade.

(b) To the first grade (sub-pro-tem), vice Mr. V. Narayana Ayyar on other duty as Extra Assistant Conservator (sub-pro-tem)—

Mr. C. Sankunni, Ranger, second grade.

(c) To the second grade (permanent)—

Mr. M. Pakyanathan, Ranger, third grade.

Mr. K. P. Benjamin, Ranger, third grade.
Mr. B. R. Salisbury, Ranger, third grade.

(d) To the third grade (permanent)—
Mr. W. S. Fernandez, Ranger, fourth grade.
Mr. N. C. Mahadevan, Ranger, fourth grade.
Mr. A. Rama Hebbar, Ranger, fourth grade.
Mr. N. K. Sarma, Ranger, fourth grade.

(e) To the third grade (sub-pro-tem)

Mr. S. Ramachendra Ayyar, Ranger, fourth grade, in the arrangement caused by the promotion of Mr. C. Sankunni as Ranger, first grade, sub-pro-tem)

Mr. A. Swamikutti, Ranger, fourth grade, in the vacancy caused by the deputation of Mr. M. Hussain Khan Bahadur on other duty as Assistant to the Special Chenchu Officer, Kurnool.

(f) To the fourth grade (permanent)—
Mr. M. Ambu, Ranger, fifth grade.
Mr. B. Ponnaya, Ranger, fifth grade.
Mr. P. Miranda, Ranger, fifth grade.
Mr. A. Siddan Pillai, Ranger, fifth grade.
Mr. R. Alagiriswami Naidu, Ranger, fifth grade.

Leave:—Mr. K. L Munuswami Ayyar, Ranger, second grade, in charge of Odugathur range, North Vellore division in granted privilege leave for one month and twenty six days and furlough for one year in continuation thereof with effect from the date of relief.

MAY 11TH 1920.

M. R Ry. E. K. Krishnan Avl, granted privilege leave for 3 months with effect from date of relief.

M. R. Ry. V. N. Seshagiri Rao to act as D. F. O. North Vellore during the absence of M. R. Ry. E. K. Krishnan Avl.

M. R. Ry. V. Narayana Ayyar Avl. D F. O. West Vellore, to be also Deputy Collector in the North Arcot District.

Confirmation — Mr. T. S. Narayanaswami Chetti (M. R. L), acting Ranger, seventh grade, in charge of Sidhout range, North Cuddapah district, is confirmed in his appointment with effect from 1st October 1919.

Extension of Leave — The privilege leave for three months granted to Ranger Mr. A. Bhavayya, Chittoor district, is extended by one month's sick leave on half pay on medical certificate from 22nd April 1920.

Posting and Leave. — (1) Mr. N. C. Mahadevan, Ranger, sixth grade, on return from the privilege leave is posted to the charge of Palnad range, Guntur district.

(2) Mr. A. Sidda Pillai, Ranger, fifth grade in charge of Palnad range, Guntur district, on relief by No. (1), is granted privilege leave for two months and fifteen days

Promotions — The following foresters are promoted to act as Rangers, seventh grade, *sub pro tem*, and posted to the districts noted against their names:-

Abd-ul-khaliq Sherif, forester, first grade—Kurnool East.
W. F. Tunasfield forester, first grade—Upper Godavari.
A. J M. Surrie, forester, first grade Kurnool West.
A. Narasinga Rao, forester, first grade—Kurnool West.
S. Varadarajulu Reddi, forester, first grade—Kurnool West.
K. Shaik Mahammad, forester, first grade—Ganjam
D. V. Krishnarao Nayudu, forester third grade—Ganjam.
Abd-ul-razzaq forester, first grade—Ganjam.
B. Venkayya Nayudu, forester, first grade—Lower Godavari.
G. V. Govindarajulu Nayudu, forester, first grade—Parlakimedi Maliahs.
R. Madira, forester, third grade—Upper Godavari.
V. Parthasarathi Nayudu, forester, second grade—Kurnool East.

Reduction — Mr. R. Guruswami Ayyar, Ranger, first grade, Mudumalai, Nilgiri division, reduced to the bottom of the third grade of rangers, with effect from the date of receipt by him of the order.

Leave — Mr. C. Sankuni, Ranger, second grade, Coonoor range/ Nilgiri District, is granted privilege leave for two months from date of availing himself of the leave.

MAY 18TH 1920.

Mr. L. R. Narayana Ayyar, Ranger, third grade, is on return from leave, transferred to North Vellore division for the charge of Odugathur range, vice Ranger Mr. K. L. Munuswami Ayyar granted leave.

Mr V. Muthuswami Chetti, Forester, first grade, North Vellore division, is posted temporarily to the charge of Odugathur range, until relieved by Mr. Narayana Iyer.

Mr. G. Devanayagam Nayudu, Ranger, fifth grade, is transferred from West Vellore division to North Vellore division and is posted to the charge of Gudiyattam range.

Mr. C. R. Raghunathan, Ranger, sixth grade, is on return from leave. transferred from Trichinopoly division to South Arcot division and is posted to the charge of Cuddalore range.

Mr. A. R. Anantarama Ayyar, Ranger, seventh grade, North Vellore division on relief by Mr. G. Devanayakam Naidu, is posted to special duty in the same division.

Mr. N. Swaminatha Ayyar, Ranger, second grade, now on leave, is posted to charge of Udamalpet Range, South Coimbatore division. To join on the expiry of leave, i. e. on 23rd May 1920.

Mr. Ibrahim Albiz Ranger, fourth grade, Udamalpet range, South Coimbatore division, is transferred on relief by Mr. N. Swaminatha Iyer to Nilgiris and posted to charge of Segur range.

Mr. G. A. Jesudasan Pillai, Ranger, sixth grade, Segur range, is on relief by Mr. Ibrahim Albiz posted to Ootacamund range as Assistant Ranger.

Mr. V. Jagannatham Pillai, Ranger, seventh grade and Assistant Ranger, Ootacamund, is granted three months privilege leave with effect from date of relief.

MAY 25TH 1920.

F. L. C. Cowley-Brown Esq. Principal, Madras Forest College, Coimbatore, granted combined leave (privilege leave, and furlough on average salary) for six months from or after 7th July 1920.

M. R. Ry. K. A. Chengappah Avl., E. A. C. granted furlough for six months in continuation of the privilege leave already granted to him.

C. C. Wilson Esq. Dy. Conservator of Forests, and Imperial Instructor, at the Madras Forest College, Coimbatore, to act as Principal of the Forest College during the absence of F.L C. Cowley-Brown Esq. on leave, or until further orders.

M. R. Ry. P. Govinda Menon Avl. is confirmed as Extra Assistant Conservator of Forests with effect from 1st January 1920.

M. R. Ry. M. P. Halasyanatha Ayyar, Forester I grade, Bellary District, is appointed to act as Ranger VII grade with effect from 1—5—1920, *vice* Mr. C. Mahony, probationary E. A. C. and is posted to work under the orders of the D. F. O. Bellary.